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ABSTRACT

This proceedings of the 1998 conference of the International Association of Technological University Libraries (IATUL) contains the full text of the following papers: "A Library Ready for 21st Century Services: The Case of the University of Science and Technology (UST) Library, Kumasi, Ghana" (Helena Rebecca Asamoah-Hassan); "Libraries in Partnership: Defining Our Core Roles for the 21st Century" (Gaynor Austen); "Library Purchasing Consortia: Achieving Value for Money and Shaping the Emerging Electronic Marketplace" (David Ball and Jo Pye); "The UK Electronic Libraries Programme" (Michael Breaks); "Information Literacy: The Key Competency for the 21st Century" (Alan Bundy); "Consortia Licensing, Information as Infrastructure" (Andy Crowther); "Measure for Measure: A Post-Modern Critique of Performance Measurement in Libraries and Information Services" (Rowena Cullen); "The KMAT: Benchmarking Knowledge Management" (Martha de Jager); "GAELIC: Consortial Strategies for Survival" (Heather Edwards); "Avoiding the Reefs and Rips While Riding a Relevant Technology Wave into Rural Regions" (John Frylinck and Vicki Williamson); "Factors Related to Faculty Publishing Productivity" (Carol Ann Hughes); "Doing More for Less" (Mike Johnson); "Smarter Higher Education: Information Literacy Adds Value" (Cathy-Mae Karelse); "The Implementation of the Greek Union Catalog" (Anthi Katsirikou); "User Access to the Hybrid Library" (Peter Leggate and David Price); "Riding the Technology Wave" (Pierre Malan); "Library Resource-Sharing in the Network-Centric World" (Rob McGee); "People in a Technology Driven Future: On the Social Relations of New Information Technologies [Keynote Address]" (Ojelanki K. Ngwenyama); "Using the Internet To Support Lifelong Learning: The Role of the Librarian" (Robert Newton, Rita Marcella, Alan MacLennan, and Iain Middleton); "Launching Transformations at the Academic Information Service, University of Pretoria" (Heila Pienaar, Mary-Rose Russell, Yzelle

Roets, and Hilda Kriel); "Collaboration between a Technological University Library and Tenant Firms in a Technology Park in Thailand: New Challenges for Librarianship in a Developing Country" (Nongyao Premkamolnetr); "Every Time I Figure out Where It's At, Somebody Moves It!" (Eugenie Prime); "Malaysia's Multimedia Super Corridor and Roles of Information Professionals" (Edna Reid); "Library Leadership and Re-Engineering: An Israeli Experience" (Nurit Roitberg); "Global Literacy Initiatives: The United States and Developing Nations" (Lynne Rudasill); "The Truth Is in the Details, Lessons in Inter-University Library Collaboration" (Murray C. Shepherd); "Millennial Megatrends: Forces Shaping the 21st Century" (Philip H. Spies); "Relevance from Reality" (Talikka Marja); "Remote Electronic Resources and the OPAC: Illustrated by the UNISA Library Experience" (Ina Van der Merwe, Welna Van Eden, and Sandra Hartzer); "User-Education in a Flexible Learning Environment: An Opportunity To Stay Relevant in the 21st Century" (A.J. Van Vuren and J.C. Henning); and "The New Library, A Hybrid Organization" (Leo Waaijers). (MES)

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CONTENTS

Asamoah-Hassan, Helena R. University of

Melck, Antony, Prof. University of South

Science and Technology, Kumasi, Ghana
▶ Full text document
▶ *"A library ready for 21st century services?: a case of the university of science and technology library, Kumasi, Ghana"*

Austen, Gaynor. Queensland University of Technology, Australia
▶ Full text document
▶ *"Libraries in partnership: defining our core business for the 21st century"*

Ball, David. Bournmouth University, United Kingdom
▶ Full text document
▶ *"Library purchasing consortia: achieving value for money and shaping the emerging electronic marketplace"*

Breaks, Michael. Heriot-Watt University, Edinburgh, United Kingdom
▶ Full text document
▶ *"The UK electronic libraries programme"*

Bundy, Alan. University of South Australia, Australia
▶ Full text document
▶ *"Information literacy: the key competency for the 21st century"*

Cassidy, Vincent. Academic Press
▶ *"Consortia licensing, information as infrastructure"*

Chipoya, Douglas Manase. Zambia Library Association, Zambia
▶ *"Transcending conventional information work: a strategy for librarians and other information workers in Africa to be relevant in the 21st century"*

Cronjé, Johannes. University of Pretoria, South Africa
📼 Audio tape. Order tape.
▶ *"Less is more - more is less (More or Less) - Challenges facing higher education in the world-wide village"*

Crowther, Andy. Academic Press
▶ Full text document
"Consortia licensing, information as infrastructure"

Cullen, Rowena. Victoria University of Wellington, New Zealand
▶ Full text document
▶ *"Measure for measure: a post-modern critique of performance measurement in libraries and information services"*

De Jager, Martha. Arthur Andersen Africa
📼 Audio tape. Order tape.
"Economics, education and the academic information sector"

Ngwenyama, Ojelanki K., Prof.
📼 Audio tape. Order tape.
▶ Keynote address
"People in a Technology Driven future: On The Social Relations of New Information Technologies"

Newton, Robert. Robert Gordon University, United Kingdom
▶ Full text document
▶ *"Using the Internet to support lifelong learning: the role of the librarian"*

Panel Discussion Moderator: Dr. Errol Tyobeka, Director, Public Science and Liaison Dept. Arts, Culture, Science and Technology Dr. Adi Paterson, Rob McGee, Dr. Edna Reid, Henry Watermeyer
📼 Audio tape. Order tape.
"Mainstreaming the developing world"

Paterson, Adi. Prof. CSIR, South Africa
📼 Audio tape. Order tape.
"The impact of technology on the management of knowledge in developing countries"

Pienaar, Heila; Russell, Mary-Rose; Roets, Yzelle and Kriel, Hilda. University of Pretoria, South Africa
▶ Full text document
▶ *"Launching Transformations at the Academic Information Service, University of Pretoria"*

Premkamolnetr, Nongyao. King Mongkut's Institute of Technology, Thailand
▶ Full text document
▶ *"Collaboration between a technological university library and tenant firms in a technology park in Thailand: new challenges for librarianship in a developing country"*

Prime, Eugenie. Hewlett-Packard, Palo Alto, CA, USA
📼 Audio tape. Order tape.
▶ Full text document
▶ *"Everytime I figure out where it's at, somebody moves it!"*

Reid, Edna. Teja Information Services Sdn. Bhd., Malaysia
📼 Audio tape. Order tape.
▶ Full text document
▶ *"Malaysia's Multimedia super corridor and roles of information professionals"*

De Jager, Martha. Arthur Andersen
▶ Full text document
▶ *"The KMAT: benchmarking knowledge management"*

Edwards, Heather M. University of the Witwatersrand, South Africa
▶ Full text document
▶ *"GAELIC: Consortial strategies for survival"*

Frylink, John. Curtin University of Technology, Australia
▶ Full text document
▶ *"Avoiding the reefs and rips while riding a relevant technology wave into rural regions"*

Hughes, Carol Ann. University of Iowa, USA
▶ .PDF document
▶ *"Factors Related to Faculty Publishing Productivity"*

Johnson, Mike. CHEST & NISS, UK
Audio tape. Order tape.
▶ .PDF document
"Doing More for Less"

Karelse, Cathy-Mae. Western Cape Tertiary Institution's Trust, Calico - INFOLIT, South Africa
▶ .PDF document
▶ *"Smarter higher education: information literacy adds value"*

Katsirikou, Anthi. Technical University of Crete, Greece
▶ Full text document
▶ *"The challenge of cooperation: the attempt of Greek Academic Libraries to create their union catalog"*

Leggate, Peter. University of Oxford, United Kingdom
▶ Full text document
▶ *"User access to the hybrid library"*

Malan, Pierre. SABINET Online (Ltd) Pty, South Africa
▶ Full text document
▶ *"Riding the Technology Wave"*

McGee, Rob. RMG Consultants, Inc.
Audio tape. Order tape.
▶ Full text document
"Library Resource-Sharing in the Network-Centric World"

Roitberg, Nurit. Technion-Israel Institute of Technology, Israel
▶ Full text document
▶ *"Library leadership and re-engineering - an Israeli experience"*

Rudasill, Lynne. University of Illinois-Urbana, USA
▶ Full text document
▶ *"Global literacy initiatives"*

Shepherd, Murray. University of Waterloo, Ontario, Canada
▶ Full text document
▶ *"The truth is in the details: lessons from library collaboration"*

Spies, Philip H. Creative Futures
Audio tape. Order tape.
▶ .PDF document
▶ *"Millennial megatrends: forces shaping the 21st century"*

Sunter, Clem. Anglo American, South Africa
Audio tape. Order tape.
"What it really takes to be world class"

Talikka, Marja. Lappeenranta University of Technology, Finland
▶ Full text document
▶ *"Relevance from reality"*

Tate, T.H. Rutgers University, USA
▶ *"Teaching and learning models in the 21st century: a technological response"*

Van der Merwe, H.C.J.; Van Eeden, W. and Hartzer, S. UNISA, South Africa
▶ Full text document
▶ *"Remote Electronic Resources and the OPAC: illustrated by the UNISA Library Experience"*

Van Vuren, Anette Janse and Henning, Judy. Technikon SA, South Africa
▶ Full text document
▶ *"User education in a flexible learning environment - an opportunity to stay relevant in the 21st century"*

Waaijers, Leo. Delft University of Technology, Library, Delft, The Netherlands
▶ Full text document
▶ *"The library as a hybrid organisation"*

Back to the IATUL Home Page

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A LIBRARY READY FOR 21ST CENTURY SERVICES: THE CASE OF THE UNIVERSITY OF SCIENCE AND TECHNOLOGY (UST) LIBRARY, KUMASI, GHANA

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University of Science and Technology Library
Kumasi, Ghana

INTRODUCTION

A university library well stocked with up to date materials in whatever form is the envy of any university. This library in years gone by was not hard to come by. In recent years however, the global economic crunch has brought cuts in funding including for libraries, making university libraries look more like archives. Journal subscriptions cannot be renewed, adequate new editions and new titles cannot be purchased and enough personnel cannot be trained and employed to man libraries. This situation gets worse by the day especially in the university libraries in developing countries where infrastructural facilities like electricity and telephones cannot be relied upon for electronic information transmission if even they have the technology at all. These libraries are however expected to give value service to their clientele - students, faculty and researchers - comparable to what obtains in university libraries in developed countries. It is in this category that the University of Science and Technology Library in Kumasi, Ghana falls.

THE UNIVERSITY OF SCIENCE AND TECHNOLOGY LIBRARY

Historical Background

The library has been in existence since 1951. It however has a chequered history in its development. When the College of Technology, Science and Arts Ordinance No. 19 of 1951 was promulgated, the Teacher Training College at Achimota, Accra was moved to Kumasi along with its stock, of 4,000 volumes to form the nucleus of the library. [1] These books were mostly on Education, Physical Education, Fine Arts, Housecraft and Religion. To these were added books on Commerce, Science, Pharmacy, Engineering, Agriculture, Architecture, Town Planning and General Studies when these departments were established. When the stock grew, a full time Librarian was appointed.

In 1954, the Carnegie Corporation donated $8,500 which was used to purchase some American Technical books. The United States Government in 1957 also donated 2,000 volumes of books of various technical subjects.

Soon after independence in 1957 the library suffered some dismemberment. The Government decided to make the College of Technology, Science and Arts a purely technological institution, so some of the departments which did not fit in were moved to other places. The Teacher Training Department was moved to Winneba in December in 1957 with a collection of 1,270 books on education and related subjects. The Housecraft and Music department in 1958 were also transferred to Winneba with 1,080 books. In December 1959, the Commerce department was also moved to Achimota as the nucleus of the present School of Administration of the University of Ghana with a total of about 3,600 books on Commerce, Banking, Accounting, Political Science and other related subjects. In 1962, the department of Liberal Studies was also transferred to the University College of Cape Coast with 650 books. These series of events affected the growth of the Library greatly.

The Library was initially housed in a prefabricated building which had a seating capacity for 135 readers.

In April 1961, it moved to its newly completed building which has a capacity for 100,000 volumes and 250 readers, which houses the library presently. As at the end of 1961 the book stock of the library was 24,362. After an intensive acquisition drive, the stock had grown to over 52,000 volumes by the end of 1968. 2 As at end of September 1992, the main library had 145,480 volumes of books and subscribed to 1700 periodicals. It had been offering traditional library services like acquisition, cataloguing, circulation, reference, serials and interlibrary loans.

Current services

The library's collection is strong in the pure, applied and engineering sciences with a few on the humanities. The collection in the main library as at end of September 1997 was 166,219 volumes and 514 titles of journals. In recent times the stock has been added to through the World Bank Book Project where some tertiary institutions in the country had a supply of new books and journal subscriptions under an agreement between the Government of Ghana and the World Bank. It is under another World Bank Project that the extension to the library building started in 1981 was completed in 1997. The 4-storey building extension which is solely for readers with a capacity for 1,200 readers is yet to be furnished and occupied. The ground floor rooms now house the African Virtual University (AVU) Project, which is a satellite transmission of educational instructions from Ireland and the United States for students.

The network of libraries in the university consist of the Main Library and the 11 Faculty/School/Institute/Centre libraries. These are the Faculty of Agriculture, Faculty of Environmental and Development Studies, Faculty of Social Sciences, Faculty of Pharmacy, Faculty of Science, Faculty of Art, School of Medical Sciences, School of Engineering, Institute of Renewable Natural Resources, Institute of Mining and Mineral Engineering, Institute of Land Management and Development which together has a total of about 70,000 volumes and with the main library provide the information needs of the university community.

The Main library has the following departments; Acquisitions, Cataloguing, Serials, Lending, Undergraduate Reference, Reference, Publications of the United Nations and related Agencies, Ghana Collection, Reprography and E-mail Services. It offers readers services like lending, reference, short loans, CD-ROM, Photocopying and E-mail.

The reprographic services offer microfilming and photography to the university community first and then to the general public.

There are 15 professional staff and the library is governed by a library committee comprising representatives from faculties/ institutes/centres. At the end of 1997 the library had 2194 registered users. Non registered users are however allowed the use of the library's facilities inside the library premises.

Since 1995 the library has embarked upon computerising its cataloguing practices. A database named 'Catalo' has been created using the Micro CDS/ISIS Software Version 3.07. Over 8,000 records have been entered which represent books processed from January 1995. Manual cataloguing and classification is being done, since we do not have access to the BiblioFile and other quick processing methods. This makes processing of materials very slow. There are 4PCs in the cataloguing section for data input and searches. There are plans to set up a Local Area Network (LAN) to enable users access 'Catalo' on-line and also for use as a circulation system. We intend to have Open Access Public Catalogue (OPAC) so 6 Pentium MMX Processors have recently been acquired for this.

There is the CD-ROM with its dedicated PC in the Serials Section. Softwares on Science and Engineering can be accessed. Update of softwares are however not regularly received.

E-mail services are also being offered to the university community and the public. "Points" are being installed on request in various offices on and off-campus. The library will soon be hooked unto the Internet through an aid programme from the Danish Government for Ghanaian university libraries.

The E-mail services is however not perfect because of constant power cuts. It is necessary to state that the library still offers traditional library services, manually in addition to these attempts to computerise. These services are grossly inadequate in terms of speed and efficiency. The traditional method of accessing information through physically combing through books and journals as is being practiced in this library must give way to computer and electronic information systems.

The computerisation of the library is also suffering some setbacks because there are plans for an Integrated Management Information System for the 4 older universities in Ghana - Accra, Kumasi, Cape Coast, Winneba - where the libraries will have modules. This has not taken off and library personnel have not been involved in the designing of the module.

With the World Bank Book Project now ended, there is serious thought about how to acquire new books since the funding from government is very inadequate. The problem of maintaining journal subscription caused by inadequate funding is also staring the library in the face.

These mean that there is need for a change. This change has become necessary because of various factors.

FACTORS CAUSING CHANGE

Change is a challenge. An unresponsive university library may be sidelined in this age of change if it is adamant. Cronin [3] supports this need for change when he opines that "Inertia, redundancy and proceduralism are features of the university library system, cemented by years of smugness and arrogance on the part of our knowledge custodians. Since we, the academic community are now routinely required to account for our actions and performance, is it not time that those academic related staff who superintend our university libraries were likewise asked to account for themselves?" Change therefore in this age is a necessity but it must be made after activities which had been carried on earlier, old roles, perceptions and responsibilities have been assessed, to determine if they are still useful or not to the society today. Most times change is accepted because the new information age cannot accommodate most of the roles and perceptions of yesterday.
The main factors which have made it pertinent for our library to contemplate shifting from its old ways of information provision are as follows.

Economic recession

The global economic recession, coupled with the economic crisis in Ghana in the 1980s, brought about the Structural Adjustment Programme (SAP), which reduced drastically the funding of government establishments including universities and their libraries. Contrasting sharply is the high cost of scholarly books and journal subscriptions today. This means that only few journals can be subscribed to and only a few books can be purchased.

Inadequate Staffing

With the student population of over 2000 and teaching staff of over 500 there is need for more than 15 professional staff to man the library service points. Lack of funds has brought about the employment of only the number available now. Only a few para and non-professional staff can also be trained as professionals. This is a serious drawback to the provision of effective services to users.

Information explosion

There is now a lot of information in various formats, print and electronic, and from various sources. These pose constant challenges to library staff especially in deciding which types of materials to select and the type of equipment needed to retrieve the electronic information, in terms of cost and durability. This information explosion has brought about an overload of information and in its wake an increased pace of work. Bichteler [4] says that work which hitherto was done in days now is expected to be done in hours. This situation has not gone down well with us as we now cannot cope with the speed especially as we are coming from a service which has been more traditional. We have accepted the change so we will improve.

Technological Innovations

The increased pace of work has brought in its stride the development and use of new technologies like on-line databases, integrated automated library systems, knowledge based systems, networking etc. These are fast changing how many things used to be done. In academic libraries in developed countries on-line searching in remote databases, desktop computers on desks; CD-ROMs and Local Area Networks in reference work, Internet, Integrated library computer systems, Electronic imaging systems are in use. These improve productivity and service delivery, and change the level of interaction between the librarian and the client for the better. These are what the University of Science and Technology Library looks up to in the coming century in order to offer value service.

Fortunately efforts are being made to acquire enough computers to be used. The major constraint however is this. The new technologies need huge financial investments. With the little funding available the question is whether we have to cut off maintenance or slow down the traditional services we offer now in order to save up enough to invest in the new technologies? This is why we rely mostly on aid from donor countries to equip our libraries.

The recent introduction of distance learning for university education in the country has put a lot of pressure on libraries to link up with satellite programmes abroad for the benefit of such students. These make it imperative that we provide means for such service, which are the new technologies. The university library today realising the need for change because of emerging global trends needs to decide on the types of change which will enable it to offer effective service.

TYPES OF CHANGES

Some areas of library work will need to be changed or improved upon if the library aims at being relevant in the 21st century.

Collection Development

The library will need to change or update its collection development policies and procedures to enable its collection to develop into one which will be improved by digital technologies and electronic information sources. This is important to allow for ease in the identification of scholarly materials since one will have access to a great number of them, though the problem of selection will be present here.

It will also be necessary to decide on the tilt in the collection development. Will it be heavily towards digital or still on print information. Both have their usefulness. Digital has a richer mix in content, very good searching and retrieval qualities, extended information links and expands available knowledge. Print is convenient to use as it can be moved around, is easy to use in the accessibility to its contents and is a useful back up. Digital information is a very useful mode for receiving distance information which is inevitable in achieving success in distance learning programmes.

Interlibrary Loans and Document Delivery

Interlibrary loans is not a new service. It is the method used today which is new. Photocopying machines, electronic catalogues of libraries, electronic interlibrary messages using facsimile, electronic mail and satellite transmission which offer service at a very rapid speed and limited time wastage are being used now. Documents are now largely supplied through electronic means rather than by the movement of hard copies, which have improved accuracy and brought about user satisfaction. We can only benefit from this if our telecommunication and electricity supply infrastructure are effective. Irrespective of these new developments the use of hardcopy and postal services for document supply cannot be excluded altogether, Baker [5] warns. This gives us some breathing space since as at now our library carries on its interlibrary loans mostly through the 'hard copy' method.

Modern information delivery must of necessity include interlibrary loans since no library can stock all available information. Requests therefore will need to be transmitted electronically among libraries in a network so that a single message could go through all available libraries. This is faster and cheaper. The UST Library is already doing this through E-mail.

The library sometimes cannot pay for information it needs from a service overseas which may be full-text electronic files or facsimile copies so it has to let it go because the end user may want it for free as they are used to such free services here. There is therefore the need for a more realistic approach to the value of information in commercial and economic terms if people really need available information.

The Virtual Library

Saunders [6] says this is a system by which the user may connect transparently to remote libraries and databases using the local library's OPAC or a university or network computer as a gateway. The virtual library will also make available links to other resources, annotations to items available at a specific place or a thesaurus, which can be used alongside other resources. It is hoped that the virtual university facilities for the University, which is now situated in the new extension to the library will be exploited to provide a virtual library for the university community soon.

Staff Roles

Roles of professionals and paraprofessionals are going through some changes because of new technology, limited budgets and increased expectation of users. This constantly brings confusion in who should do what. To straighten this out Gorman [7] suggests that the number of tasks deemed to be professional should not exceed the number of tasks which need to be performed by professionals... no professional should do a task which can be performed by a paraprofessional, no paraprofessional should do a task which can be performed by a clerical staff, no human being should do a task which can be performed by a machine.

In our library, staff have taken on additional duties because there is limited recruitment of new personnel. Only vacancies are filled. There are no establishments for new positions.

Librarians as they go up the ladder here are required to carry out research and publish and take very active parts in the professional, scholarly and in other university service. These areas are looked at in evaluating their performance. Some are also involved in teaching some courses in some departments in the university. Others are involved in planning information policies and working on strategic plans for the integration of communication and information systems on the university campus.

Paraprofessionals, because of the introduction of computerisation, especially in the cataloguing department, now do work hitherto done by professionals like cataloguing and classification which are copied from the Cataloguing-in-Publication-Data records in the book, as well as searching for subject headings in the computerised lists and copying such found classification numbers unto identical books. The changing roles mean staff need to be retrained to work with the new information systems. Most of our staff have gone through series of such training programmes at home and abroad, which are now being used to greatly improve their services especially those who have access to computers.
What is important to be done, which is still largely undone, is the redefining of our image as collectors and preservers of books to a more active role in supporting higher education and scholarship. We need to provide information to our users and educate them on how to access the several information resources of this age. If we shirk this responsibility, we will be swept off our present positions with the increasing need for change. This is what Veaner [8] warns by writing that" if we as librarians keep a low profile and maintain an indistinct picture of who we are and what we do, we contribute to the confusion and ultimately almost guarantee that the politicians will choose the wrong systems and wrong staff mix for providing information to the scholarly and general public" This warning needs to be seriously heeded.

We need to clarify our own status to our users, in our library and to ourselves. We need to clarify the scope of our responsibilities and obligations as professionals in the academia and get involved in the university's administrative committees and activities in order to remain relevant in the system.

Head Librarian's Role

The demands of modern information delivery calls for new and additional roles for the head librarian. The most important is the ability to welcome change and accept challenges, lead in an atmosphere of ambiguity, be flexible, listen and accommodate views of others but be firm in decision making and take responsibility for change. He must develop and sustain team work and have a participatory process for decision making. Responsibility and authority have to be shared. He must have a vision, powerful and positive enough to propel the library forward.

He should assist the staff to manage the rapid changes in service to users by planning workshops, seminars and other training programmes for them. We have only recently been urged to move from paper-based to automated library and now on to creating the electronic library just in about only 25 years. Staff have not fully recovered from the stresses caused by the earlier demand for changes to automation and are now expected to move to another realm.

Accountability in terms of usage of time on tasks and assets and finances must be of concern to him in order to account for the huge investment put in the library. He will need to also plan fund raising programmes to support the library.

Shaughnessy [9] advises that the head librarian should fully grasp the 7 classic management functions - Planning, Organising, Staffing, Directing, Coordinating, Reporting and Budgeting in addition to leadership abilities in order to survive in this new information age.

He must recognise the importance of needs of today in order to lay out a good information system for the future and find ways to link traditional and electronic resources for the benefit of the users.

Other Changes

We need to engage in more cooperative ventures like interlibrary loans and resource sharing to satisfy users.

We are trying to establish a network in order to fill gaps in our libraries. Tis means each university library in Ghana will have access to the bibliographical sources of the other university libraries. When we are hooked unto the Internet then we can have access to international on-line services and so have access to the worldwide information network.

We now need to think seriously about charging fees for services rendered, because sources for information provision today are expensive. I agree with Coffman [10] that " fees are a potential income for libraries... There are existing commercial document deliverers who make profits. How cannot libraries do the same? They only have to be business like in their operations, or in the alternative strike agreements with the users and commercial document deliverers and give them access to our large stock of information and collect a percentage of revenue generated."

The reduction in funding from government also means we should cut costs. Resorting to the new technological information sources is a means of sourcing cheap information. Though the capital investment for these new technologies is high, the potential information to be retrieved through these technologies is limitless. It is therefore necessary for libraries to cut costs and generate internal and external revenue to support the acquisition and maintenance of new technologies for information acquisition.

THE 21ST CENTURY UNIVERSITY LIBRARY

My vision for the University of Science and Technology Library, Kumasi, Ghana in the soon with as 21st century is this:

- Red tape/bureaucracy must be reduced drastically to allow for rapid staff development, and recruitment to support the library's aims and objectives, give enough power to staff to take necessary decisions, and involve genuine staff participation especially in policy formulation.
- It must be oriented mainly towards meeting user needs and the delivery of high quality services. It must exhibit modern approaches to provision of information. It must be committed to collection development policies which integrate IT-based and conventional stock information sources. Users must be trained and assisted in the use of IT in the library. All sorts of information networks must be exploited in addition to book, journal and audio-visual collections.
- Library staff must support students in independent learning and for project work and dissertations. It must be a real learning organisation.
- It must have a flexible structure where the library will be able to move into a new information world, where resources will be networked, new and different actions aimed at success will replace existing ones and where the great number of users of the library will never ever physically visit the library.
- The library must work closely with Faculties and Institutes in academic planning, monitoring and evaluation, teaching and learning strategies, information technology strategies and modular planning.
- It must have an entreprenuerial approach to securing resources to support innovations.
- It must take a firm stance to market the library especially through workshops, publications, meetings, discussion papers and promotional events, like pamphlets and brochures.

I agree with Line [11] that the 21st century university library must be 'customer-based, concerned with and for its staff, efficient in its use of resources, imaginative in its use of technology, well-managed and visibly and demonstrably a first class service. It cannot stand still, it is constantly awake to new circumstances need and opportunities and designed for continual flexibility". This is my dream for the University of Science and Technology Library of Kumasi, Ghana.

CONCLUSION

The development of information is ongoing. There is information explosion today which makes it necessary for information providers, and in this wise, libraries, to devise more efficient ways to process and retrieve information for optimal use. This inevitably calls for change especially in ways of doing things for improvement.

The University of Science and Technology Library of Kumasi. Ghana, can no longer hold tightly to only the traditional library practices and expect to satisfy its users. It has to accept the change sweeping through information provision and address it adequately. Funds have always been a barrier to development but there can be a beginning. Fortunately, aid programmes are available and some of these new technology equipment can be acquired through them. If the library wants to remain relevant in today's information age then it should be thinking seriously about measures to launch it into modern information delivery so as to fit into library services of the 21st Century. As it stands now, there is still a lot to be done.

The University of Science and Technology Library in Kumasi, Ghana does really have a choice. A choice to be useful to its clientele by striving to provide the necessary technologies which will make its work easier and its clientele happier. If it fails to ride on the tide, the waters will overwhelm it and sweep it down stream with us, to inertia, redundancy and eventual oblivion.

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Back to contents

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LIBRARIES IN PARTNERSHIP : DEFINING OUR CORE ROLES FOR THE 21ST CENTURY

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Queensland University of Technology, Brisbane, Australia

Today's university libraries are facing some of their greatest ever challenges, as we make the transition to an electronic age. In many countries, government sector funding to universities is declining. Within universities, resourcing for libraries is now, in many cases, competing with resourcing for student information technology laboratories and the demands of multi media teaching. As student learning moves increasingly to mechanisms based on the Internet, many policy makers and administrators query the continuing relevance of library services to the teaching and learning process. Whilst such assumptions may seem naive to the experienced librarian, it is often such simplistic views which influence the financial support provided to libraries to fulfil their mission.

In order to confirm our role within the new models of teaching and learning now being developed, libraries will need to focus their attention on activities which add value to the academic process, activities which enhance this process in a way which cannot be equally or better performed by other agencies. Traditionally, academic libraries have seen their core business as being acquisition, cataloguing, processing, and lending of materials, and assisting readers with specific information queries. Although for many years libraries have co-operated in, and outsourced, the provision of cataloguing records, most other activities have been performed in-house, often using manual, labour intensive methods to handle physical information artefacts. Today, in contrast, a growing percentage of information used by libraries is not housed within the library building at all. Such information is increasingly, in fact, available direct to the individual scholar's workstation. Even that material which is physically housed in a library building can be obtained, and managed, in ways not imagined fifty years ago. In such an environment, what is the core business of the university library? How does it add value to the information chain? Will this be further impacted by the new models of learning being developed within universities, particularly those leading to flexible delivery of curriculum content?

University libraries can integrate their services into such new learning models, particularly if they work in partnership with academics and with other specialists. However, libraries will require resources, particularly staffing resources, to accomplish this. At a time when funding support is static or reducing, such resources can only be generated by releasing them from other work within the library.

A number of Australian libraries have been investigating alternative means to free up such resources. Outsourcing of activities has increased, and some libraries have moved to serial consolidation services. Such initiatives have, however, not always resulted in the maintenance of the service quality which the library supplied previously to its clients. Two Australian university libraries, Griffith University and the Queensland University of Technology, both located in Brisbane, have embarked on a different course to ensure the release of library resources from technical processing areas, while maintaining a high standard of library service. Both libraries decided to enter into partnerships with library vendors, following recommendations from external consultants. Each, independently, chose the Blackwell's Library Supply company to share this partnership.

The concept of vendor partnership is a critical element in the philosophy of Total Quality Management. The founder of this philosophy, W. Edwards Deming recommended as one of his 14 key points:

> "Develop long-term relationships with a limited number of suppliers, based on loyalty and

trust"[1]

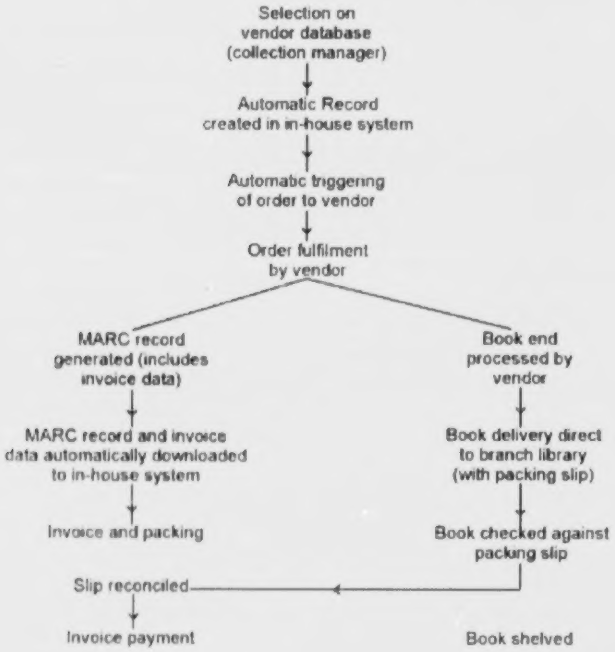
Such a concept requires that the vendor and the client organisation work together to ensure the streamlining of work processes, and to locate tasks at the point where it is most logical and cost effective for them to be performed.

At QUT, we have pursued this philosophy. We have developed a vendor partnership which:

- guarantees the vendor a large proportion of our (not inconsiderable) business. 70% of monograph purchases and 90% of our paid serial subscriptions (ie most commercial publications), are channelled through Blackwell companies.
- allows direct ordering by the library on to the vendor database, including necessary electronic transfer of information back to the library's inhouse system.
- supplies catalogue records from the vendor, or via Australia's National Bibliographic Database, direct to the QUT library system.
- provides end processing services (at a cost), and direct delivery of materials to branch libraries, bypassing the need for much of the material to transit the Technical Services Sections.guarantees the library a significant discount on normal pricing, in exchange for the substantial increase in business volume.

Once fully in place the process for acquisition of library materials at QUT will be:

MONOGRAPH PROCESS


Selection on vendor database (collection manager)
Automatic Record created in in-house system
Automatic triggering of order to vendor
Order fulfilment by vendor
MARC record generated (includes invoice data)
Book end processed by vendor
MARC record and invoice data automatically downloaded to in-house system
Book delivery direct to branch library (with packing slip)
Invoice and packing
Book checked against packing slip
Slip reconciled
Invoice payment
Book shelved

SERIALS PROCESS
(Consolidation)

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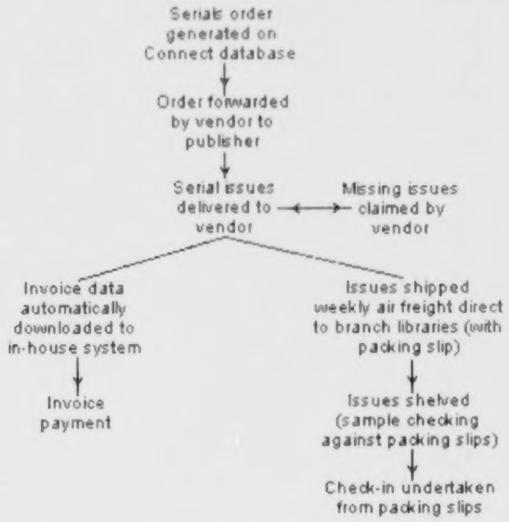
Serials order generated on Connect database
Order forwarded by vendor to publisher
Serial issues delivered to vendor
Missing issues claimed by vendor
Invoice data automatically downloaded to in-house system
Invoice payment
Issues shipped weekly air freight direct to branch libraries (with packing slip)
Issues shelved (sample checking against packing slips)
Check-in undertaken from packing slips

In order to streamline the selection process, collection profiles for QUT Library needs have been be established on the Blackwell's Collection Manager database, and approval plan/blanket ordering will be instituted wherever practicable.

From the point of view of QUT Library, this new partnership has already resulted in substantial price reduction in purchase prices of acquired materials. It will increase the speed of order generation, and of material delivery. Even more importantly, it has already, and will in the future, release staff resources previously assigned to technical processing work. This will enable us to transfer such resources to the new roles which are becoming increasingly important if the library is to increase its interaction with its community.

As outsourcing and vendor partnership begin to relieve staffing pressures in acquisition and processing functions, so can patron self check out machines, self reservation, self renewal, etc., relieve loans function staff demands. Much routine clerical processing can, these days, be automated or even, in some circumstances, outsourced. Many Australian libraries are now transferring their lending systems to patron operated self check-out machines. Once these become the standard means of generating loans of library materials, lending services staff will be only required to deal with complex loan operations or client problems. Such mechanisms, can, like bank Automatic Teller Machines, release further staffing resources. These resources can then be redeployed into areas where they do create added value to library services. Partnership with other libraries in resource sharing (including interlibrary loan and reciprocal borrowing) can enhance such service levels.

As traditional library roles transform, however, different critical roles emerge for academic library staff. Use of the Internet has opened up new means of teaching and learning. The impact of teleteaching, distance education and teaching on the Web on the form of university education will be profound. Once, the delivery of courses in "distance education" mode was provided chiefly for geographically isolated students. Today, universities across the globe are experimenting with needs for flexible study options, whether such students be locally based, geographically isolated, or resident on the other side of the world. There is a danger that such electronically "packaged" courses will obviate the need for information searching behaviour by the student. Without the need to learn how to locate, sift, prioritise and integrate information, student learning becomes little more than rote repetition of facts. In terms of lifelong learning, such an approach removes the acquisition of critical long term skills. One of the important new roles for university library staff, therefore, will be to work with academics, and other relevant specialists, to ensure the appropriate inclusion of information seeking (whether via print or electronic means) in courses offered in flexible delivery mode. Librarians need to ensure that the intended outcomes of particular instructional units include the acquisition of information literacy skills by students.

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As Steele points out in a paper to an Australian government sponsored seminar on Resource Based Learning:

> "...it seems likely that there will be a move away from designing courses and then expecting the library to supply appropriate learning materials, to designing courses around the availability of appropriate electronic documents and networked resources. Librarians will need to develop a high level of comprehension of the educational perspectives of academic staff and find a suitable mechanism for appropriate dialogues." [2]

Teaching staff are increasingly coming to recognise that course development in flexible mode requires specialist skills. Teaching staff may rightly claim subject discipline expertise. However, many are now willing to admit the need to work with specialist educational technologists with the skills necessary to mount effective units/subjects on the World Wide Web. It is critical for the creation of positive educational outcomes that librarians ensure that they also become part of such teams, and that their roles as information content specialists are similarly recognised within this process.

Librarians can no longer afford to remain within the walls of the library building, waiting for clients to seek them out. The librarian's skill must now be taken to the client. The place for an academic librarian in the future will be outside the Library building, actively involved with the academic community. Most Australian university libraries have adopted the concept of "liaison librarians", professional staff whose primary responsibility is to work with the staff of a particular faculty or academic department, in order to ensure that the information needs of the academic unit are being met by the library service. One Australian university, the Curtin University of Technology, has even trialed the of concept of basing liaison librarians physically within the faculty building, rather than in the Library, in order to increase this personal interaction. Many other Australian university libraries are similarly experimenting with alternate means of linking librarians integrally into academic developments.

In order to integrate itself into the academic process fully, the University Library needs to seek opportunities to establish its value as a partner in course development and delivery. Liaison librarians should seek out membership of Course Development teams and of faculty Teaching and Learning Committees. Librarians must come to be seen as equal partners with teaching staff in these fields - a difficult, but critical, achievement.

Can librarians add value to such groups? Certainly, provision of advice on how to locate resources to support program content is important (the "resource professional" role). However, equally important is the need to ensure that the way in which the curriculum is constructed encourages student research, information seeking, evaluation and synthesis, rather than simply feeding back specific data in rote fashion. Teaching staff need to be convinced that developing courses which impart skills to facilitate further learning in their field is critical to any academic program. There is a need for librarians to ensure that the building blocks of lifelong learning are laid within such courses.

In providing critical infrastructure for the university of future, the academic library's outreach activities will be enhanced by operating in liaison and course support teams, working along side IT support personnel and educational technologists. The skills of these three groups are today indispensable to the formulation of flexible courses based on a combination of online, print and audiovisual technologies. By developing teams which can work in partnership with academics, new learning models can be developed which combine the best aspects of educational design with important information resource strategies.

Support for the research activities of university staff and students can similarly benefit from input from such multi-skilled teams. There exists in research, as in the teaching arena, a naive view that the skills of the academic librarian will in future become irrelevant, as unmediated information delivery becomes the norm. It is suggested that the academic will interact directly and effectively with her/his relevant sources of research information. Such views ignore the limited personal capacity of most teaching and research staff to manage the burgeoning flood of literature available electronically in their field. The need for skilled information navigators to guide, train, and, at times, to mediate for users, remains significant. Academic librarians are ideally placed to fulfil this role. Often, they will need to work with research clients individually. They will develop in-house specific subject gateways, adapt external gateways for best local use, seek out and advise on appropriate information resources (both print and URLs). In some ways they will act as general faculty research advisers, research advisers operating at a high professional level. The best self help mechanisms for resource users may well be developed in-house, whilst drawing heavily on globally available tools, such as international Internet subject gateways. Again the concept of working in partnership with teaching staff to facilitate improved research processes and outcomes is critical.

The traditional university library must today provide innovative solutions to significant challenges - challenges to its continuing relevance, and to its very existence. The use of vendor partnerships, automation, and outsourcing arrangements, can help to release the resources required to make this transition. It is up to library managers to use these resources creatively. We must seek opportunities to work with teaching staff, and with other specialists, in internal partnerships to develop new models of learning for the Internet age.

What is our new core business? This will only become clear over time. However, the value which librarians can add to processes such as course development and delivery will require continuing interaction with others across the university. The establishment of external and internal partnerships are an important step in this. If such partnerships fail to materialise, it will be the educational outcomes for our students which will, ultimately, suffer.

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I certify that this contribution is original. It has not been copied from, or published, elsewhere.

However, I wish to note that the second half of this paper draws heavily on a paper prepared for the conference New missions of Academic libraries in the 21st Century, to be held at Peking University, Beijing, 25 - 28 October, 1998. GAYNOR AUSTEN

BIOGRAPHICAL DETAILS

Gaynor Austen is Director of Library Services at the Queensland University of Technology, Brisbane, Australia (1991+).

She holds a Bachelor of Arts (Hons) Degree from the University of Melbourne, a Diploma of Librarianship from the Canberra College of Advanced Education, and a Master of Business Administration Degree from the University of Queensland.

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Back to contents

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LIBRARY PURCHASING CONSORTIA: ACHIEVING VALUE FOR MONEY AND SHAPING THE EMERGING ELECTRONIC MARKETPLACE

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Abstract

Drawing on a current study, funded by the British Library Research and Innovation Centre, the context of higher education libraries is discussed, including funding and costs and recent major official reports on education and libraries. Future trends and imperatives are outlined. Models of library purchasing consortia are presented. The operation of the Southern Universities Purchasing Consortium's Libraries Project Group is examined in detail. The lessons and benefits of consortium membership are discussed. The future influence of purchasing consortia, particularly on the regional library and on electronic publishing are examined.

1. Context

1.1 General

The library market in the UK is rich and active. The four sectors that are the subject of our current study, funded by the British Library Research and Innovation Centre, have some fairly well established statistical series. These demonstrate the following spend for 1995/6[1]:

	Books (£000s)	Serials (£000s)	Total (£000s)
Further education*	12,056	4,110	16,166
Health Service**	3,299	5,717	9,016
Higher education	41,000	60,000	101,000
Public libraries	110,000	7,000	117,000
Total	166,355	76,827	243,182

* 1994/5

** Budget, not expenditure

1.2 Higher education library trends

These bald statistics do however mask some worrying trends, familiar to many of us. They are well illustrated for higher education institutions (HEIs) by the historical summaries for the period 1985/6-1995/6 provided in the LISU Annual Library Statistics 1997[2]. (There are unfortunately two sets of statistics, one for "old" universities, one for "new", compiled for historical reasons on rather different bases).

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Taking first the "old" university libraries, the most striking factor is the rise over the period in student numbers from 333,000 to 705,000. This rise is accompanied by a (smaller) rise in the number of academic and academically related staff, from 47,000 to 79,000. The number of full-time equivalent professional library staff also shows a significant increase, from 1361 to 1977, but post-1994 data represent a differing sequence from previous years due to provision of composite statistics drawn from HESA and SCONUL. Taken together, these figures show a rise in the user population of 106%. The ratio of users (students and staff) to each member of professional staff, even using the enhanced figures above, shows a corresponding rise of 42%, from 279 to 396.

Absolute expenditure shows some significant rises, particularly for periodicals, from £16.9m to £39.3m. However, if adjusted to take account of inflation and the rise in student numbers, the figures paint a very different picture. Total real library expenditure per capita shows a fall of 26% from £358 to £266 (1995 prices converted using the GDP deflator). The fall in real spend per capita is however much greater for books and periodicals. The real spend on books per capita (at 1995 prices, converted using the LISU academic book price index) falls from £61.55 to £28.54, that is by 54%. The real spend on serials per capita (at 1995 prices converted using Blackwell's Periodicals Price Index) falls from £125.60 to £50.20, that is by 60%.

"New" university libraries are in a similar situation. For the average new university library, the user population has risen from 9,338 to 19,195, that is by 106%. The number served by each member of professional library staff has risen from 406 to 670, that is by 65%.

Using the same deflators as for "old" universities, absolute expenditure has declined by 3% from £152.36 to £147.28; the real book spend by 21% from £27.68 to £21.88; the real periodicals spend by 49% from £40.57 to £20.52 (all figures per capita).

Over the period, both parts of the UK higher education sector have therefore experienced:

a) large increases in student numbers;
b) large increases in users per member of staff;
c) decreases approaching 60% in real spend per capita on books and serials.

1.3 Higher education: the future

The year 1997 will be remembered as the Year of the Reports in the library profession in the United Kingdom. A number of far-reaching Government policy documents was published, affecting all library sectors covered by our study. In the higher education sector, the long awaited Dearing report [3] did much to raise the profile of cross-sectoral collaboration. It set out a framework for co-operation between higher and further education as well as public sector libraries, which embraced the expansion of new technologies, transfer of expertise and lifelong learning. Also in higher education, the Pilot Site Licence Initiative (PSLI) evaluation studies [4] paved the way for the establishment of networked electronic information resources as an integral part of the academic library portfolio. Dearing's message was heralded by the Kennedy [5] and Higginson [6] reports, which addressed further education provision through learning technology and widening participation for non-traditional students.

While the future may not hold in the UK an increase in student numbers to match that of the last 15 years, the environment will change and demands increase. Pressure on library budgets will continue.

Students are contributing more to their own maintenance and to fees, either through loans, earnings or savings; there is little incentive to spend on books.

New technology is welcome, and offers opportunities for new services and alternative methods of delivery. But only in relatively few places does the digital form offer a direct replacement for the hard copy; even then it puts increased pressure on capital budgets. Innovation also necessitates additional staff training and user education.

Teaching methods have changed and the trend to resource-based, that is library-intensive, learning will continue. The proportion of non-traditional students (e.g. part-timers, distance learners) will continue to increase: indeed it has been argued that, since as many as 80% of full-time students may have part-time jobs, the full-time student is in fact a rarity. Such non-traditional students require more support and longer library opening hours.

1.4 The wider context

In the past year, a number of other reports have signaled high-level changes in public policy, with important implications for the future of libraries. Government green and white papers on a more responsive National Health Service raised the profile of health libraries, as did the revamping of nursing education and the establishment of regional health libraries groups around the country. Public libraries however received the most attention, beginning with the then Department of National Heritage's Reading the Future report [7], followed by the Library and Information Commission's New Library: the People's Network [8], the National Audit Office's Due for Renewal [9], the Department of Culture, Museums and Sport's National Grid for Learning [10], and since January the Government's white paper on lifelong learning [11] and their positive response to the People's Network report [12]. All have served to secure the future role of public libraries by placing them firmly in the centre of a developing national information infrastructure supporting lifelong education and information delivery and much more besides. In Scotland and Wales, successful devolution initiatives look set to alter substantially their regional government framework, thus affecting library services.

It therefore seems certain that the library landscape will change dramatically over the coming years, and that this change will be driven by cultural and political factors as much as by technology.

1.5 Higher education imperatives

This analysis of the financial and cultural context in which higher education libraries operate exposes a number of management imperatives:

a) Target Staff Resources
It is a cliché to see staff as the most valuable resource of an organisation. Nevertheless, in the modern library we gain most from customer care, or front-of-house operations, from liaison with our academic staff and from technical innovation. The background operations, for instance of acquiring and processing books and serials, are necessary to our efficient functioning, but not the highest priority for a scarce and valuable resource.

b) Gain Value for Money
In this competitive market place, with suppliers chasing library purses that are shrinking in real terms, the customer can demand the lowest prices combined with a high-quality service. However, just like manufacturing industry, we also require stable long-term relationships with suppliers, whom increasingly we regard as partners in our operations.

c) Exploit New Communications Technology
Much ink has been expended on the importance of new technologies for the delivery of teaching. At a more mundane level, we should not underestimate the potential of electronic communication with our users (e.g. electronic capture of inter-library loan requests or book suggestions) and our suppliers (e.g. EDI, uploading check-in data from serials agents). Real efficiency gains are possible, by shaking time, paper and duplication out of the acquisitions process.

d) Precipitate the Electronic Publishing Revolution
We are still waiting for the full benefits of the electronic publishing revolution. Our users know what is possible. Frustratingly we are not yet in a position to deliver it to them, largely because the electronic corpus does not yet exist.

e) Enter Strategic Partnerships
Individual libraries alone cannot achieve imperatives (b-d). Indeed, pace eLib, the higher education sector probably cannot in isolation create and exploit new technologies. It is only through co-operation and partnership, with other elements of the higher education sector, with libraries in other sectors, and with suppliers and producers, that we can hope to radically alter the market place.

It is evident that the collaboration represented by purchasing consortia has a potentially vital role to play in the future.

2. Purchasing consortia

The figures in 1.1 above illustrate the potential for savings in the main sectors. While agents' discounts on serials are low and apparently in further decline, the demise of the Net Book Agreement (NBA) provided an obvious opportunity to use the power of consortium purchasing to gain discounts from the generous margins on books. Our initial investigation of existing purchasing consortia suggests two interesting, if not entirely unexpected, hypotheses:

a) Library purchasing consortia tend to function as part of larger established general consortia. This implies that such consortia tend to be both single-sector and concentrated in sectors with well established co-operative or hierarchical structures.
One notable exception is the Wessex Libraries Purchasing Consortium. This is an independent consortium, set up following the demise of the NBA for the sole purpose of library purchasing. It is avowedly cross-sectoral, with members drawn from higher education, further education, the Health Service and the private sector.[13]

b) Partly because of the nature of libraries, the consortia tend to be fairly laissez-faire. There is no central buying, warehousing or distribution. Members are expected, rather than contractually required, to purchase from the agreed suppliers.

3. The Southern Universities Purchasing Consortium

3.1 Background

Higher education purchasing in the UK exemplifies the model outlined Section 2 above: a regional network of seven consortia is well established. These consortia are:

- Higher Education Purchasing Consortium Wales
- Joint Consultative and Advisory Committee on Purchasing (covering Scotland and Northern Ireland)
- London Universities Purchasing Consortium
- Midlands Universities Purchasing Consortium
- North East Universities Purchasing Group
- North Western Purchasing Consortium
- Southern Universities Purchasing Consortium (SUPC)

Earlier years saw an emphasis on non-library high-spend areas, e.g. catering, stationery, IT. However as market conditions changed, particularly with the demise of NBA, the consortium infrastructure was already in place to take advantage.

We shall examine in some detail the operation of the Southern Universities Purchasing Consortium. Please note that the views expressed here are those of the authors, not necessarily of the SUPC.

Founded in 1974, the SUPC is a mature and flourishing organisation, open to institutions in receipt of Higher Education Funding Council for England (HEFCE) funding. At the time of writing there are 30 full members, and seven associate members. Despite the size it is very focused; only HEIs, chiefly universities, are members.

One important characteristic is that parent institutions, not libraries, are members. There is generally commitment to the SUPC at the highest level within these institutions; other bodies, such as funding agencies and auditors, are aware of its activities. There is therefore institutional and sectoral expectation that full use will be made of SUPC-negotiated agreements.

The SUPC is generally regarded as one of the more successful consortia. This success arises partly from its size: on published statistics, the members have a combined spending power approaching £1bn. It also derives from the level of activity, seeded by a full-time professional Regional Purchasing Co-ordinator and two Assistants, aided by increasing numbers of purchasing professionals in individual HEIs.

3.2 Aims and Objectives

Of the aims and objectives of the SUPC, we would highlight the following:

a) "the negotiation of special discounts on a group basis";
b) "to secure the advantages of group purchasing";
c) "raising the purchasing profile at all levels";
d) "seeking and developing strategic alliances".

Using the muscle offered by group purchasing is a fairly obvious aim. However, it must be borne in mind that the SUPC is a combination formed by very different, completely autonomous HEIs. There is little scope or indeed infrastructure for centralised purchasing and distribution.

One of the most important aspects of SUPC activity is raising the level of purchasing professionalism. This is achieved partly by example, partly by involving other professions through the project-group structure, but also by education and training.

As we noted earlier, the formation of strategic alliances with other consortia and public organisations is an important means of managing the purchasing environment.

3.3 Obligations

Membership of a consortium of course brings obligations as well as benefits. Members are expected to keep confidential information such as the terms of SUPC agreements, and also to abide by the ethical code of the Institute of Purchasing and Supply.

But the most important obligation is active participation in consortium agreements. If members do not use the agreements, a consortium will fail. Libraries in particular have in the past had fairly comfortable relationships with suppliers. In the UK this was due in part no doubt to the existence of the NBA, which created an environment of fixed prices, thus exacerbating a general reluctance on the part of librarians to negotiate.

3.4 The Libraries Project Group

The SUPC's activities are structured in a number of Commodity Areas: Building and Site Services; Catering; Computing; Furniture and Related Equipment; Printing, Stationery and Office Equipment; Professional Services; Scientific Equipment and Laboratory Supplies. Each Commodity Area is then further structured into a number of Project Groups.

Practically all areas of HEI activity are covered. This breadth of scope demonstrates the importance of the partnership between purchasing professionals and professionals working in individual commodity areas.

Even within one project group, such as Libraries, the number of members gives rise to a wide variation in the requirements of any agreement. The SUPC will therefore typically negotiate with one or more suppliers a framework agreement, which will satisfy the majority of expressed needs of members. Individual libraries are then able, within the overall framework, to customise the agreement to their individual needs. Such agreements therefore have both universal and bilateral characteristics.

The SUPC has major agreements in place both for serials, and for monographs and standing orders. The latter agreement is the more complex, and demonstrates the potential of consortium purchasing for securing substantial discounts.

3.4.1 The Serials Agreement

From its inception over 20 years ago, SUPC had an informal arrangement with a subscription agent. This arrangement offered a retrospective rebate based on total SUPC spend, together with settlement discounts for advance payment of invoices. Journal prices were based on the agent's list price; in many instances this price is higher than the publisher's list price as it includes a handling charge. About 80% of SUPC members' serials requirements were purchased through this arrangement.

In March 1995, the SUPC recognised the need to tender formally this arrangement. The tendering process was carried out in accordance with the European Purchasing Directives. Potential suppliers were visited to assess their service capabilities. Financial assessments were also undertaken; these were of particular importance because of the practice of paying for serials in advance.

The tender was based on: discount, or handling charge, on the publisher's list price; settlement discounts for advance payment of invoices; and retrospective discounts based on total Consortium expenditure. This pricing structure enabled easy comparison of the bids on a like-for-like basis, since there were no precise lists of journals purchased on which to base the evaluation. Prices for consolidation services were also sought. Consolidation services are particularly advantageous for North American journals. Members could decide on the consolidation services required and payment profile to suit their individual requirements. The evaluation took into account the cost of transfer of subscriptions.

The contract was awarded to two agents and members were free to choose whichever agent they wished. The exercise realised savings, releasing additional funds for members' diminishing budgets. In percentage terms these savings were relatively small: agents themselves operate on small margins.

3.4.3 The Monographs and Standing Orders Agreement

Potentially 33 libraries could participate in the agreement. This number would obviously be attractive to suppliers, representing a significant slice of the academic market. It therefore gave the negotiators a good bargaining position.

But the number also posed problems of diversity. Member libraries buy all kinds of materials, including grey literature and standing orders, on the widest range of subjects, from all possible markets (UK, EU, US, etc.). They also have very diverse requirements for servicing, invoicing etc.

Before inviting suppliers to tender, a survey of the membership was undertaken to determine the likely spend, existing suppliers, and requirements for servicing.

The tender process itself aimed essentially for transparency of pricing, to eliminate the cross-subsidy of a wide range of servicing that operated under the NBA. Suppliers were therefore invited to tender:

- on the basis of discount from the publisher's list price;
- for one or more of four markets: UK, Rest of Europe, North America, Rest of the World;
- quoting itemised individual servicing costs.

Prices were required for: covering paperbacks; strengthening books; jacketing hardbacks; ownership stamping; affixing barcodes, bookplates, security tags, date and spine labels; and for supplying cataloguing. Members would therefore be able to pick and mix on the basis of true servicing costs within an overall headline discount.

The suppliers who elected to tender were subject to routine financial checks. Those who could supply members' needs were then visited by representatives of the working group. These visits typically lasted several hours and were crucial to the selection process: they enabled the working group to get a real feel for the company, and particularly for its systems and quality procedures.

Those suppliers clearing all the hurdles were finally invited to meet the working group to provide a final clarification of their bids. The purpose of these meetings was to ensure that suppliers understood the basis on which the Consortium was working, namely the transparency of pricing mentioned above, and were structuring their bids appropriately.

Following this stage a final evaluation of the bids was undertaken, and a recommendation put to a meeting of the Libraries Project Group. The outcome was that one supplier was accepted for the UK market, and a second for all the other three markets. Discounts of course varied from market to market, but were by any measure substantial.

3.4.4 Lessons

A number of lessons can be drawn from the operation of the agreements outlined above.

Firstly, members are concerned to achieve both high discounts and quality of service. If service is poor, the result is aggravation for all and low take-up of the agreements.

Secondly, active management, not only of the tender process, but also of the contracts awarded, is essential to ensure that: a) the most appropriate suppliers are chosen; b) quality of service is set, maintained and improved.

Thirdly, a partnership between purchasing and library professionals is most advantageous. This enables the pooling of expertise and knowledge: negotiation, contract management and procurement regulations are not necessarily areas where librarians have strong skills and experience.

Finally, consortium members like a choice. Human relations do play a part; some librarians may not wish to deal with a particular supplier. A large element of competition is also healthy. However, for such competition to be effective, the terms (particularly the discounts) offered by the agreed suppliers must not differ too widely.

4. Benefits of Consortium Membership

We identify four major benefits arising from consortium membership; the second is probably the most significant in the long term.

Firstly and most obviously, there are financial savings. Discount rates vary from the headline-grabbing percentage on UK monographs to much smaller rates on serials. In many universities' budgets however, small percentages on serials are significant in terms of actual money saved.

Secondly, we believe that the SUPC, and the other consortia active in the library sector, have radically affected the marketplace. Suppliers now realise that libraries will band together and, more importantly, will demonstrate their commitment to such associations by moving their business to recommended suppliers. Libraries now also require real transparency of pricing: it is their only means of taking informed decisions on the disposition of scarce resources.

Thirdly, librarians themselves are becoming much more aware of the procurement process, of market dynamics and of the power of group purchasing. Nearly all library staff are to a greater or lesser extent involved in the purchasing process. We all send messages, conscious or unconscious to our suppliers. It is the duty of those of us most closely involved to ensure that this awareness is increased.

Finally, consortia have increased the level of co-operation and partnership between libraries; they have brought into being new partnerships between libraries and purchasing professionals; and they are opening the door to new possibilities of partnership with other strategic players and with the suppliers themselves.

5. The Future Role of Purchasing Consortia

5.1 The supply chain

Obviously all active consortia have a full agenda: they have current agreements to manage, expiring agreements that will generate a new round of tendering, and new areas for tender. But in addition to these bread-and-butter operations, there are a number of areas of activity in which we foresee consortia playing a significant role.

In order to establish likely areas of future operation, let us first examine the costs of making materials available to our users. In a much simplified model, these costs may be broken down as follows:

- Library's costs
- Supplier/intermediary's costs
- Supplier/intermediary's profit
- Publisher's costs
- Publisher's profit

Generally consortia discounts have come from intermediaries' costs and profits. There is more to be gained here across the sectors, but our attention needs to be directed to the entire supply chain.

5.2 The regional library

Our experience of working with single and multi-sectoral consortia has demonstrated that they are able to satisfy the requirements of very diverse libraries. This ability leads us to believe that regional library collaboration is a viable means of reducing libraries' costs. Our analysis of the political context in 1.4 above indicates that the regional dimension will have increasing importance for libraries.

The model in Figure 1 shows separate autonomous idiosyncratic library services across four sectors. The services of these libraries are tailored to the needs of very different groups of users, but they are supported by pooled common background functions: acquisitions, cataloguing, library system. These functions are contracted out to a separate agency, and the individual libraries are free to concentrate on their core service to users.

There is the benefit of a ring main of shared information: a union catalogue, a union borrower database.

There should also be economies of scale arising from this pooling. These will reduce the costs of individual libraries. There may also be additional economies from cutting suppliers' costs, who may be dealing with fewer agencies. There may also be scope for dealing directly with the major publishers, thus in some cases eliminating suppliers' costs and profits

5.2 Electronic media

The area not so far tackled is the profits and costs of publishers. Many librarians, and indeed vice-chancellors, share the feeling that this is the area most deserving of attention, but one difficult to affect directly because of the buffer of suppliers.

In the UK current interest centres on the National Electronic Site Licence Initiative (NESLI). This grew from an analysis of an initiative begun in 1995 by the Higher Education Funding Council for England, on behalf of the other UK funding bodies, called the Pilot Site Licence Initiative (PSLI). The aim of PSLI was: "…to test whether the site licence concept can deliver material widely to the academic community, whether it can allow more flexibility in the use of material, whether the concept can adapt to a variety of formats, to test legal arrangements and, finally to explore whether increased value for money can be achieved." [14]

It is interesting to note that the initial accent of PSLI was on hard copy; electronic access was to an extent a by-product. [15] Now the Joint Information Systems Committee (JISC) has taken on responsibility for developing the successor electronic service, NESLI, with the aim of providing ?access to a wide range of full-text journals across the network. [16] This will be achieved by a managing agent, appointed by the JISC to provide the following service: "manage delivery of the electronic material, undertake negotiations with publishers and oversee the day-to-day operation of the programme to ensure that it provides value for money through cost effective operation." [17] At the end of April 1998, it was announced that this function of a managing agent is to be filled by the serials agent Swets & Zeitlinger in partnership with Manchester Computing (University of Manchester).

This is a welcome development. Swets is well placed to pursue the international dimension, recognised as important by the JISC and the academic community. Manchester Computing is widely respected as the host of datasets such through MIDAS.

It is very early to pass judgment, but some concerns do arise from our experience of purchasing consortia.

The first is the lack of competition. There seems initially to be no choice of supplier or interface for HEIs. This is of course to an extent an operational matter and may be rectified in time. But more importantly, there is the question of the long-term implications for the market. What will be the effect of one of the four main serials agents having a near monopoly on the supply of core electronic journals to the academic community?

The second concern is the relationship between the serials agent and the publishers; this applies to any agent, not particularly to Swets. All the agents are in a very delicate and difficult position. They depend for their livelihood on the discounts from publishers; therefore they do not have a strong negotiating position vis-à-vis the publishers. Some unkind librarians see them as agents of the publishers, rather than agents of their customers.

An arrangement ensuring competition and choice, and providing a strong independent negotiating buffer may be preferable.

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ABBREVIATIONS

HEFCE	Higher Education Funding Council for England
HEI	Higher education institution
HESA	Higher Education Statistics Agency
IT	Information technology
LISU	Library and Information Statistics Unit, Loughborough University
NBA	Net Book Agreement
NESLI	National Electronic Site Licence Initiative
PSLI	Pilot Site Licence Initiative
SCONUL	Standing Conference of National and University Libraries
SUPC	Southern Universities Purchasing Consortium

Back to contents

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IATUL

THE UK ELECTRONIC LIBRARIES PROGRAMME

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Introduction

The UK Electronic Libraries Programme (eLib) was established in 1995, following the publication of the Libraries' Review Report (Follett Report) at the end of 1994. The Review had been set up to address some of the problems faced by libraries through:

- the rapid growth in student numbers,
- the increase in the volume and cost of scholarly literature,
- the move towards self-directed learning,
- the conflict between the demands of teaching versus research,

all taking place within an environment where budgets were shrinking. However, there were a number of opportunities presented by developments in information technology, including stable or even falling prices of technology, advances in networking, and the provision of networked datasets to higher education staff and students, that could be taken advantage of by the Programme.

eLib Phases 1 & 2

One of the main conclusions of the Follett Report was that a substantial sum should be devoted to creating the electronic library, but it also resulted in a number of other initiatives, including:

- the Library Buildings Programme, which provided central matched funding for the building of new libraries or the expansion of existing buildings to provide additional reader places;
- funding for cataloguing of special collections and archives to make them more available to researchers;
- the Journal Site Licence Initiative, which explored the issues around providing libraries with site licence access to the electronic journals of four major publishers at no additional cost;
- the establishment of the Arts and Humanities Data Service, which is exploring how best to provide scholars with access to digital research material created by institutions or research groups;
- a national strategy for supporting research by creating 'national collections' of print resources;
- and the eLib Programme.

The aim of the £15m three year eLib Programme was to establish ?collaborative partnerships between libraries, academic staff, publishers and others, to promote large-scale pilot and demonstrator projects focusing on the components of a future electronic library service, and to provide stimulus to its creation.? The UK already had a well developed national technical and organisational infrastructure, with a strong national network (JANET), together with a network of committees and agencies already in place. In addition, most institutions had invested in powerful campus networks and in clusters of workstations for students, so that they were ready to deliver any new services to their staff and students. The eLib Programme was able to take advantage of this technological and organisational infrastructure to rapidly establish its projects.

The 60 eLib projects were selected from over 400 submissions and Phases 1 & 2 covered six Action Lines, including:

- exploring new methods of document delivery,
- electronic publishing,
- digitisation,
- electronic course readers,
- access to network resources,
- training and awareness.

The Programme was underpinned with a range of supporting studies.

One example of the Access to Network Resources projects is the Edinburgh Engineering Virtual Library (EEVL). EEVL is based at Heriot-Watt University Edinburgh, and has created a gateway to engineering resources on the Internet. Resources are selected, described and facilities provided for searching and browsing the database of over 3000 resources. EEVL, which now attracts over 3000 hits per day, was established in 1995 and is to be funded until 1999. One of the Training and Awareness projects, Netskills, is based at the University of Newcastle and has developed a variety of training tools for staff and students to introduce them to the Internet and to the range of services and facilities now available to them. This has been done by seminars, workshops and online courses and has reached a very wide coverage.

eLib Phase 3

Most of the Phase 1 & 2 projects will finish in 1998, though a number have made the transition from project to service, and a further £3m has been awarded to carry forward the successful projects and to fund Phase 3 of eLib. Phase 3 is intended to use some of the outcomes of the first set of projects and to take advantage of newer technologies in order to build new models of library services. Phase 3 projects fall into three main areas:

- 'Hybrid Libraries', which aim to provide seamless and integrated access to resources in both electronic and print formats;
- Z39.50 projects, which will explore the issues around using this protocol to link together both regional and subject library catalogues and provide integrated access to resources;
- a major digitisation project, which will explore the technical and managerial issues around creating and preserving large collections of digitised material.

Lessons Learnt

The UK higher education library community has learnt much from eLib and this has been helped by a programme of both formative and summative evaluation, which has encouraged projects to draw out the major issues that can be transferred from the Programme. eLib has also ensured that the lessons learnt from the Programme have been widely disseminated and each project has been required to actively publicise its activities. Many of the lessons learnt from eLib have centred around people - librarians and users - and how to change effectively the perceptions of both library staff, academic staff and students, so that they are more receptive to using electronic information resources.

eLib has not been a research programme, but a development programme and it has been essentially about 'learning by doing', as well as about 'learning from mistakes'. The projects have been short-term pilot projects which can deliver results within the time frame of the three year Programme. eLib has been about creating a more informed library workforce, about helping both librarians and institutions to understand the changing environment and to help them plan for the future of electronic information.

Back to contents

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IATUL

INFORMATION LITERACY: THE KEY COMPETENCY FOR THE 21ST CENTURY

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Paper presented at the Annual Conference of the International Association of Technological University Libraries held in Pretoria, South Africa, June 1998

There are two certainties about the 21st century - change will be a constant, and it will be a century of data and information abundance. This paper examines Australian progress in addressing the implications of both certainties, with particular reference to the higher education sector.

That sector consists of 36 public and 2 private universities serving a heavily urbanised population of some 18 million people occupying a total land area similar to the continental USA. It has several universities of technology, the five larger ones of which constitute the Australian Technology Network (ATN). These larger universities, which have about 25 000 students each, are Curtin University of Technology (CUT), Queensland University of Technology (QUT) which will host the IATUL Conference in 2000, RMIT University, the University of South Australia (UNISA), and the University of Technology, Sydney (UTS).

Characteristics of Australian higher education

Australian higher education in the late 1990s has numerous characteristics which sit happily or otherwise as defining characteristics of higher education in other developed parts of our global educational village. These are

- Mass participation - enrolment in universities increased by 73 per cent between 1983 and 1995 but lower socioeconomic groups and indigenous people are still under represented
- a slight majority of female undergraduates but a considerable majority of male postgraduates
- despite considerable efforts, a general failure to attract female students into computing, engineering and science courses and males into courses in areas such as primary teacher education, nursing and librarianship
- as occurred in the UK, the disappearance of the binary divide between universities and degree awarding colleges of advanced education in the late 1980s. Institutional mergers resulted in often quite large universities, very few of which are not multicampus and which may have several hundred kilometres between campuses - a special challenge in the provision of quality and equitable library services
- a stronger national focus on the role of, and association with, the generally non degree awarding Institutes of Technical and Further Education(TAFE)
- greater dependence on sources of funding other than the operating grant provided by the federal government
- students, particularly postgraduate students, having to contribute more to the cost of their education
- large numbers of overseas students, particularly from Southeast Asia and particularly enrolled in business, computing and engineering courses
- growth of offshore linkages, campuses and course offerings. These are focused on Southeast Asia

but are not confined to that region. My own university and library, for example, has a special linkage with President Mandela's *alma mater*, the University of Fort Hare which is near Alice in South Africa's Eastern Cape Province, and with Bandung Institute of Technology in Indonesia, among other institutions worldwide
- a focus on strategic planning, marketing, lower unit costs, accountability, quality and customer service improvement
- the growth of a philosophy of open, flexible, student centred, resource based and lifelong learning

In Australia, most of these characteristics developed or were enhanced during the years of the federal Labor (social democratic) governments of Prime Ministers Hawke and Keating from 1983 to early 1996, and particularly in the years 1987-1990. The consequences for university libraries of this are examined well in Colin Steele's *Australian tertiary libraries: issues for the 1990s*. [1] Some of these characteristics are being accentuated or modified as a result of the current conservative federal government which has user pays and economic rationalist tendencies which many consider are inimical to quality and equitable public education at all levels. This government announced in August 1996 a significant national budget deficit reduction program, one result of which was funding cuts to the universities up to the end of the century, but more flexibility for them to accept full fee paying Australian students. The working through by the universities of this fiscal and equity conundrum will clearly take some time, and has already caused considerable institutional and system wide tension and disruption. From enrolments for the 1998 academic year it is clear that few Australian students have any interest in, or capacity to pay for, the full costs of higher education. In 1996 the federal government also instigated a fiscally focused review of higher education, the outcome of which was published in April 1998. At this stage *Learning for life* [2] (the West Report) appears unlikely, despite its title, to impact greatly on the educational directions for higher education in Australia. We have a somewhat testing, in all senses of the word, Minister for Higher Education. What has caught the attention, of educational commentators has been the Minister's 21 April 1998 assertion that all final year undergraduate students will face a test at the end of their final year on

- problem solving and analytical ability
- reading comprehension
- lateral thinking
- reasoning
- data interpretation
- knowledge and understanding of their discipline
- general knowledge

I have suggested to the Minister that if he must persist with such an exercise, it would be more useful to test the information literacy of students as a persuader to universities to hasten its integration into their curricula.

The challenges for libraries

There is thus a number of challenges facing all Australian universities as the 21st century draws near, challenges which are requiring the universities to effectively reinvent themselves if they are to remain required, relevant and resourced. Among the real uncertainties and negatives about just how, and at what speed they do this, is one positive which provides the university libraries with an unprecedented opening to foster educational change, and for which there will be a high opportunity cost if the challenge is not grasped. This is the growing concern with just what should be the outcomes from a higher education when the growth of knowledge is such that the curriculum will always be behind, and when students are, or should be, developing the aptitudes for a lifelong of learning.

Libraries of all types - school, tertiary and public - are, because of their resources, those to which they have access, and because of the awareness, knowledge and motivation of their staff, the umbrella institutions of the learning society. This suggests the need for a much greater connection between those libraries than in Australia, at least, is typically the case. Few academic librarians in Australia, for example, have much indepth knowledge of, and empathy for, the work and challenges of teacher and public librarians. They should, in much the same way as our universities must remain connected to schools, to industry and to society.

There is also now evidence that society, and its individual members, is starting to pay the price for the slowness of recognition within formal education that a pervasive curriculum and methodological mindset change is required - a change resulting in every subject in every unit in every course being able to demonstrate precisely how it contributes to information literacy as a primary, not a peripheral, educational outcome.

Information Fatigue Syndrome (IFS)

For example, a newspaper business section report in 1997 noted from a survey of 1400 managers in Australia, the UK, US, Singapore and Hong Kong

> *The information explosion is making people sick, creating inefficiencies in the workplace and blighting leisure time giving rise to catchy definitions like 'analysis paralysis' and 'information anxiety'.*
>
> *Some 88 per cent of respondents to a survey felt they were being forced to track down and absorb information simply to 'stay competitive...[but] some executives claim to manage excessive information with disciplined filtering'*

Now one might think that the 88 per cent of respondents who were forced to track down information would have considered investing in a librarian to do it for them, and that those who had managed excessive information with 'disciplined filtering' had actually employed a librarian. However both scenarios are unlikely. The typical business person in Australia, at least, has not been educated to recognise that there is a corps of professionals - librarians - who can handle the systematic information gathering, analysis and dissemination at which they are so often inept. This says something about teacher librarians, public librarians and academic librarians as role models. The library profession still, despite the manifest and increasing need for its services and values, has a marketing deficit. It could be argued that the usual definition of an information literate person as someone with 'the ability to recognise when information is needed, locate, evaluate, and use effectively the needed information' should be complemented by 'and recognising when using the services of an information professional is appropriate'.

An Australian library educator, Margaret Butterworth, believes that

> *...even our top students should not be taught that they can become completely self sufficient in their search for information...the use of intermediaries should be built into formal instruction on the research process, so that students grow up with a high expectation of the type of service they can expect from libraries and information centres in the future'.* [3]

In similar vein to the survey of 1400 managers *The Professional reading guide for educational administrators* in March 1997 carried an article 'Information overload may be killing you'. [4] It stated

> *We are awash with information. We are surrounded, prodded, consumed and overwhelmed by it...The total of all printed information doubles every five years. More information has been generated in the last three decades than in all the previous 5000 put together. We are in the midst of an information explosion. And, as is the nature with explosions, the casualties are mounting up. Psychologists are increasingly talking about a strange new ailment - Information fatigue syndrome.*

The article noted that one in four managers surveyed admitted to suffering ill health as a result of the information they now handle, despite agreeing that they need high levels of information to perform effectively. Symptoms included paralysis of analytical ability, mounting anxiety and self doubt and an increasing tendency to blame others. A Dutch organisational behaviourist, Professor Gert Hopstede, was quoted in the article as saying human beings were in danger of killing themselves with information stress. He observed that

> *Human beings were not designed to handle huge volumes of data. Basically, humans are very smart chimpanzees - there's only 1.6 difference in our genes and those of our primate cousins - we program VCRs and fly space shuttles with the same brains our ancestors used to grunt signals or carve stone tools.*

With reference to the 'killer application', the Internet, he concluded 'We have created a complicated superhighway of information for very high speed travel, without training drivers...or training them how to use a roadmap'.

Hopstede is, of course, right. Only the naive and rabid technolusts believe that information technology and the Internet will provide a universal information panacea. And only the most optimistic would contend that education at all levels is grappling comprehensively and systematically with the implications of what that technology is emphasising - that we live, in developed countries at least, in an information over abundant society for which few people are well prepared, and which troubles many.

Education at a crossroads

It is now almost passe for educators to suggest, as two of my University of South Australia colleagues noted last year, that their

> *...traditional role as the fount of knowledge will change because of the information explosion. Learning will be less about knowledge residing in the head and more about learning the pathways to knowledge.* [5]

Teaching, at all levels of education, is indeed at a crossroads in addressing a reality which has existed as a possibility since Gutenberg and certainly since books and other printed material became cheaper in the 19th century, and since modern libraries focused on access rather than collections started to develop.

However it is really only in the last thirty years, as libraries, complemented by the Internet, have improved general access to data and information resources, that an alternative to didactic teaching methodologies has presented itself. Yet as long ago as thirty years one of Australia's most distinguished educators, Ernest Roe, the Professor of Education at the University of Queensland, pointed out

> *In general, 'promoting the efficient use' of resources has been nobody's business. Even where there has been active concern, significant gaps persist. A teacher may urge his students to use the library resources, provide book lists, set work which effectively directs them to the library, but takes no interest in how they use the resources he is so keen for them to use, or in whether they have the necessary skills to do so...A librarian may be actively involved in helping, in actually training, users to be skilful in search strategies, be most eager that the resources are in every sense accessible to students; but regard what students do with the 'right' book when they have located it as none of their business...* [6]

Despite fifteen governmental and educational reports which have surfaced in Australia in the last few years identifying information as a key issue for the educational, economic and societal future of the country, Professor Roe's comments of thirty years ago remain largely valid. Yet progress has undeniably occurred.

Lifelong learning

Much of that progress is to be seen in a 1980s refocusing of state secondary school curricula using resource based learning methodologies in partnership with teacher librarians pioneered by the Haycocks in Canada as Cooperative program planning and teaching (CPPT). *The common and agreed national goals for schooling in Australia* published in 1989 by the Australian Education Council has several goals which emphasise the need for information literacy. At least four of the ten goals require students to be information literate for their achievement. The 1992 Mayer Committee on key educational competencies [7] had, as its first competency, collecting, analysing and organising ideas and information. These national reports have been complemented by state versions of educational policy statements which have emphasised implicitly or explicitly the need for a focus on information literacy. There are also few tertiary education institutions in Australia which do not now include in their mission statements some reference to the fact that they aspire to prepare students for that lifelong learning which has become an international policy icon of the 1990s - an icon which it is suggested will

- help career development
- tackle unemployment
- encourage flexibility and change
- raise personal and national competitiveness
- help develop complete human beings
- preserve or develop national culture
- sustain a sense of local community
- overcome social exclusion
- build international understanding

Changing the educational paradigm

The creation of a learning culture which produces graduates with a capacity and desire for lifelong learning in a rapidly changing, complex, and information abundant environment, requires a major shift in the educational paradigm. Many Australian universities are grappling with how that shift can be achieved at a time of great organisational change and reduced financial, human, library and other resources due largely to a narrow visioned federal government. The universities of technology have been among the leaders in pushing the paradigm shift through, for example, their centres for teaching and learning which aim to foster innovation and best practice by academic staff. A number have attempted to identify the qualities they aim to inculcate in their graduates, and my own university, UNISA, after extensive university wide consultation issued in 1997 a list of seven generic graduate qualities, of which the first four are

- operates effectively with and upon a body of sufficient depth to begin professional practice
- is prepared for lifelong learning in pursuit of personal development and excellence in professional practice
- is an effective problem solver, capable of applying logical, critical, and creative thinking to a range of problems
- can work both autonomously and collaboratively as a professional

These four qualities demand information literacy, and under the second, lifelong learning, a first indicator is given as

- locate, evaluate, manage, and use information in a range of contexts ie be information literate

The inclusion of this limited reference to information literacy was one outcome of a 1993 report *Information literacy in the University of South Australia* produced by the University Library, in response to which the then Deputy President and now President Professor Denise Bradley proposed the following actions

- *...that each faculty will indicate in its 1994-1996 quality improvement plan in teaching and learning, when it will focus on information literacy as part of its teaching improvements strategy*
- *ensure that evaluative comment is made about information literacy in the reports prepared for the annual course reviews*
- *ensure that account is taken of information literacy in formal course development, approval and review processes*

In 1997 this was given further emphasis in a document produced by the University's Flexible Learning Centre *Developing the qualities of a University of South Australia graduate: guide to writing course and subject documents*. In 1998 the pace is quickening somewhat with the appointment within each of the university's effectively ten faculties of an Associate Dean: Teaching and Learning, and the University Library is currently negotiating with these Associate Deans about the integration of information literacy into faculty programs and outcomes. We recognise that, although there have been some good examples of this occurring already, they are the exception and there is a long way to go in persuading all academics of the need to change the learning paradigm. We also accept that many of our academic colleagues have not had any exposure, either in their training or in their experience as learners, to models of student centred learning. Therefore we are also aiming to identify programs suitable for longitudinal study to demonstrate what imbedding information literacy into the curriculum and teaching methodology can achieve.

The other ATN university libraries have made progress in broadening their long established skills based library user education programs to reflect information literacy concepts. Curtin, for example, states that

> ***Mission***
>
> *The information literacy program's mission is to support, promote and enhance teaching, learning and research at Curtin University by providing training which assists in the development of information literacy skills for flexible, independent and lifelong learning. Training given will assist clients to find, retrieve and manage information through various systems and in a variety of formats.*
>
> *The information literacy program supports the mission of Curtin University and links to the University's teaching and learning strategic plan.*
>
> *Special goals of the program include the development of skills and competencies that enable clients*
>
> - *to recognise an information gap*
> - *to construct alternative strategies to reduce the information gap*
> - *to select a strategy*
> - *to act on a strategy to find and retrieve information*
> - *to assess the effectiveness of a strategy*
> - *to acknowledge the sources of information and ideas*
> - *to store the information for future use*

Queensland University of Technology Library, which is reviewing its approach to information literacy in 1998, advises students that

> *Information literacy has become an essential element for citizenry in this new world. Becoming information literate during your university studies means you are learning how to learn, or, becoming lifelong learners with transferable research and learning skills and that the national 'Key competencies in teaching' project site, in which QUT is involved, is designed to focus on teacher education as a follow up on the findings of the Mayer Key competencies report. It lists competency 1 as 'The capacity to locate information, sift and sort information in order to select what is required and present it in a useful way, and evaluate both the information itself and the sources and methods used to obtain it'.*

RMIT University Libraries does not use the term information literacy but states that

> *RMIT Libraries is committed to the provision of high quality information skills education to the population of RMIT. RMIT Libraries believes that the acquisition of information skills is a key competency for students at any level, and the efficiency and effectiveness of the educational process within any RMIT subject is significantly enhanced by the incorporation of an appropriate information skills component.*

The University of Technology, Sydney Library, like UNISA, also has a large user education training program facilitated through its liaison librarians. However, in all of the ATN libraries, and although there is much useful and appreciated user education activity, that activity is still largely reactive to an outdated and wasteful teaching and learning paradigm. Helping to change that paradigm by proaction is the challenge we face. As Ford has pointed out

> *Librarians must be more forceful in defining and pushing their own aims and objectives, framed in terms of the level, quality and scope of student learning. Many of these aims may be distinct from - perhaps even conflicting with - those drawn up by other parties in an educational institution. Librarians must be fully committed to developing institutional aims and objectives involving discussions of such complementary but often conflicting points of view. They have a unique and valuable viewpoint.* [8]

The need for research

What is clearly needed to accelerate interest in information literacy by teachers at all levels of education is tangibility, and proof that it makes a difference to short and long term learning outcomes.

One South African academic commentator, Behrens, has noted

> *Information literacy is an abstract concept. As a metaphor it is a neatly packaged and imaginative descriptive phrase that is not literally applicable or easily interpretable, implying something more qualitative and diffuse than is evident.* [9]

And as another US university librarian commentator, McCrank, noted in 1991

> *The paradox of information literacy is that it calls upon librarians to change more than users...information literacy is an abstraction, an unachievable, if noble, goal. It is a process rather than a product. Librarians, like priests and teachers, are doomed to partial success unless the concept undergoes further definition, refinement, and delimitation of objectives.* [10]

What is now needed in Australian universities is to replicate considerable work undertaken by Ross Todd, a library educator at the University of Technology, Sydney. Todd has been working for several years on a longitudinal study at a Catholic secondary girls college in Sydney where he has pursued the impact of an information literacy framework integrated into classroom teaching and student learning by working with teachers, teacher librarians and executive staff of the school. That work has fairly demonstrated a worthwhile outcome. To use Todd's own words

> *Information skills instruction integrated into classroom content does contribute to the development of constructive thinkers, learners who take charge of their own learning, ask the appropriate questions, see information from a range of sources and restructure and repackage this information to create and communicate ideas that reflect their own deep understanding.* [11]

Information literacy: *zeitgeist* of the times?

Futurist Kim Long in his annual 1990 *Forecaster* heralded information literacy as a faddish, upcoming 'new buzzword'. However information literacy is clearly no passing phase or fad. Professor Phil Candy, who is one of Australia's most respected educational writers and Deputy President (Scholarship) at the University of Ballarat has observed that

> *...information literacy is the* ***zeitgeist*** *of the times...an idea whose time has at long last come. It is consonant with the reform agendas in government, in communications technology and in education...with employers' demands for an adaptable and responsive workforce. It is*

> *increasingly multidisciplinary and must be included across the curriculum at whatever level of education or training we are involved in. And finally it is consistent with the notion of lifelong learning and the fact that the only constant is change.* [12]

Candy also has made the observation that there is a tension between information literacy as a public phenomenon, and as an individual or private phenomenon. He concludes

> *...it is in fact both, and that the challenge of raising awareness amongst our colleagues and throughout society can best be described as 'dissemination'; whereas the challenge of developing the skills of information literacy in individual students and users might best be captured by the term 'insemination'.* [13]

The marketing of information literacy

In focusing on the dissemination of information literacy my conclusion some time ago was that in Australia we were faced with a marketing exercise for which no one in particular had a responsibility. There was a concern - of at least thirty years' standing - which had become a concept, and was becoming a product. That product now had a name or 'handle', and there was a virtually unlimited market with absolute need of the product but which ill recognised or ill defined the need.

Information literacy is not a 'library' issue. It is an educational, societal and democratic issue which should be of fundamental concern to all those who would call themselves educators. However the reality, at least in Australia, is that without the educational leadership of teacher librarians and academic librarians, it would not have become the issue it is now becoming.

My commitment to marketing information literacy as a national issue stemmed from a 1991 meeting with Patricia Senn Breivik at Towson University in Baltimore, a meeting to discuss academic library and computer centre convergence but which focused more on Patricia's role in establishing the US National Forum for Information Literacy. As we spoke I realised that we had to initiate in Australia a similar systematic way of focusing on information literacy if ever the considerable amounts of money spent on education at all levels were to really foster a cleverer and a better Australia into the 21st century.

In assessing how to go about this challenge, four things stood out

- Despite the fairly universal wish for an alternative term for the concept, there was no meaningful alternative to information literacy. It had, after all, not been coined by librarians but by Paul Zurkowski in 1974, and which had since been endorsed by business people and educators in the US
- That although secondary education in many parts of Australia had reflected on the issue in policy documents there was a large gap between the rhetoric and the reality. Universally the issuing of those documents seemed to coincide with cuts to library and information services and to the number of teacher librarians in schools, the very agents most able to promote and facilitate the reality
- That in other educational sectors, particularly higher education, even the rhetoric was then largely missing
- That none of the formal educational sectors - primary, secondary, technical and further education and university - saw information literacy as an educational continuum or recognised it as the one umbrella issue they had

A strategic response

I therefore decided to initiate a strategy to ensure that by 2000 every educator, educational administrator and librarian in Australia had at least heard of information literacy and was preferably aware that it was not just a 'library' issue. In taking this direction I was aware that Patricia Breivik and the US National Forum for Information Literacy has initially concentrated on selling the issue to the corporate business sector rather than to educators and to librarians. However my view was that selling the issue to corporate and professional Australia will be more credible if a strong educational and library concensus on the issue exists.

From a limited resource base within the University of South Australia Library, a key element in that strategy has been the conduct of three national information literacy conferences, the third of which was held in the national capital Canberra in December 1997 as a forerunner to the fourth which will be held in 1999 at the University of Ballarat and which will see the establishment of a broadly based Australian Forum for Information Literacy (AFIL).

The other elements in the strategy have been the publication and very wide and continuing dissemination of the proceedings of those conferences; [14] as well as publications of Adelaide based publisher Auslib Press; [15] articles and conference papers in librarianship and nonlibrarianship journals and conferences; submissions to numerous educational reviews; the establishment of an Information Literacy Taskforce of the Australian Library and Information Association which at the beginning of 1998 became a Special Interest Group of the Association; and the establishment of a national information literacy website funded largely by the University of South Australia Library.

The conferences

The first conference was held in Adelaide in 1992 and was entitled *Information literacy: the Australian agenda*. Very much a working and interactive conference, it also had two outstanding keynote speakers in Patricia Breivik and Phil Candy.

The second conference, held in Adelaide in late 1995, was entitled *Learning for life: information literacy and the autonomous learner*. It had as its keynote speakers Christina Doyle from the US and John Stephenson from the UK.

The third conference *Information literacy: the professional issue* was held in December 1997 in Canberra where many professional associations are headquartered. Its focus was on how the professions in Australia identify information literacy in their recognition of university programs for professional status, and in their own continuing education programs for their members. A major address on developing information literacy in professional practice given by Professor Candy, is well worth reading. Other speakers came from the US, New Zealand, Singapore, and not insignificantly given the location of this 1998 IATUL Conference, from South Africa.

Beyond the segregated highway

Celia Walter, reference librarian from the University of Cape Town gave a very well received paper *Beyond the segregated highway* which reviewed South Africa as a society undergoing great transformation in the face of the many fundamental challenges facing its reconstruction and development program (RDP). In the paper is described the outcomes of the May 1996 *Information society and development conference* (ISAD); the new schools curriculum framework which has been entitled *Curriculum 2005* and which has as one of its aims 'helping learners to become lifelong learners'; and the fact that, for the first time, South Africa will have a national system of education and training aimed at benefiting the whole country and all its people, ending the discriminatory apartheid system with its fifteen departments of education. *Curriculum 2005* has been strongly influenced by New Zealand's outcomes based system and it has not been without criticism. For example, as Walter points out, if outcomes for creative thinking are laid down, can that really encourage creative thinking? However, as she also points out

> *The school curricula must accommodate the needs and circumstances of learners and of the nation. Curricula are to be structured so that learners succeed. The South African school system has been bedevilled by a high dropout rate and a high failure rate amongst Black pupils. The teacher takes on a new role as the facilitator of learning, rather than as the arbiter of knowledge.* [16]

Walter also reviews the South African green paper on higher education transformation, and the information literacy implications, including the concerns of the working group on libraries and information technology which concluded

> *...a major focus for information literacy work should be...on developing an awareness of other knowledge domains and belief systems, of how knowledge is produced and validated...and an appreciation of their intrinsic value* [17]

South Africa has been more active in the information literacy area than many other regions. For example, of considerable interest in Walter's paper is an outline of the Cape Libraries Cooperative (CALICO) information literacy project INFOLIT which commenced in 1995 to provide undergraduate students, particularly those from disadvantaged backgrounds, with enhanced information literacy. The challenges she describes as facing the CALICO librarians are recognisable to all academic librarians

- the integration of information literacy into academic courses and programs
- developing their personal capacity to deliver information literacy programs
- to establish coalitions across different types of institutions, to ensure that policy becomes practice [18]

Another paper at the 1997 conference which will be of interest to anyone from a country with an indigenous population was given by Elizabeth Jones from New Zealand. *Information literacy for Maori: a cultural perspective* examines issues such as

- do Maori have a particular perspective on information literacy?
- how do they go about meeting their information needs?
- are their particular barriers for Maori in achieving a high level of information literacy? [19]

Australia has therefore, in part through its information literacy conferences, contributed to the raising of information literacy as a national, regional and global issue.

Information literacy and library competencies

Australia has also made progress in the development of library competencies and I am supervising a PhD candidate at UNISA who is undertaking what we believe is the world's first doctoral study in the area. One Australian university of technology, Curtin, has been particularly active in applying the library competencies, [20] under the leadership of its University Librarian Vicki Williamson.

In April 1998 a draft of the revised federally sponsored Australian library competencies was released, and significantly contains two units of competency relating to information literacy. The first is entitled *Develop own information literacy skills* and its descriptor reads

> *Library practitioners recognise the critical importance of self education and lifelong learning in their studies, work and everyday life. They enhance their own ability to access and use information through various systems and in a variety of formats.*

This descriptor is followed by several elements, each of which has several performance criteria attached to it. The Australian library profession is thus setting a lead by modelling a critical competency for the other Australian professions.

A second information literacy unit is entitled *Deliver client information literacy programs*, and its descriptor reads

> *Library practitioners play a prominent role in supporting the information literacy development of their clients. Learning, through instruction to staff, individual clients or groups, is enhanced where there is a clear focus on learning needs and outcomes.*

This unit has five elements, to which are also attached several performance criteria.

The reports

At the first national information literacy conference in 1992 Patricia Breivik stated

> *Once it became clear that I would be coming here I started to read the Australian literature on resource based learning, lifelong learning and information literacy...I am very jealous of the number of publications you have from your government that talk about the major issues...* [21]

One of the government reports to which Patricia Breivik referred was the 1990 review of *Library provision in higher education institutions*, commonly known as the Ross Report. As one of the five members of the working party responsible for the report, I was able to have included as a last minute term of reference 'the role of higher education libraries in preparing those training for the professions in information literacy'. The Ross Report was therefore the first of a series of Australian government reports which used the term information literacy.

It did so in a six page section entitled 'The library as educator' which included the observation that

> *Higher education has a critical role in the acquisition by adults of information literacy, but this form of literacy is part of a continuum which should commence with school education. It is a goal, a condition to be instilled in students, an emphasis on resource based learning...for that acquisition of information skills which is now one of the educational aims of most state education departments.* [22]

Among the report's other observations were that

- close cooperation between teachers/academics and librarians must exist
- information skills need to be taught in context
- librarians have an important perspective to contribute to the teaching/learning process for they see the problems clients have in carrying out research/enquiry based tasks
- librarians have a teaching role to perform, a role that focuses on information and the skills needed to access and use it
- the skills for independent learning are fundamental to both lifelong learning and the economic and social well being of our society

Also noted was that many higher education students entering higher education directly from school did not have well developed information awareness or skills and that 'higher education curricula for preservice teachers appear destined to perpetuate such unpreparedness in the future generation of school leavers'. The report's conclusion that 'Graduating teachers are in the main as unaware of these [information] issues as they were fifty years ago' is still largely true. Despite a shift to student centred and resource based learning in Australian schools in the last decade, we still have in place curricula focused on content, and the classroom teacher as an autonomous and dominating information resource and authority. How to modify that is a major challenge involving considerations of politics, power, psychology and pedagogy - educational bureaucracies, administrators, teachers and teacher unions tend to have vested, if subconscious, interests in maintaining anachronistic approaches to teaching and learning which were appropriate for the information resource limited 19th century - but which will hardly be so for the information abundant 21st century.

It does require a major mindshift to envisage schools and universities - assuming that they will continue to exist physically - where the librarians, libraries and information access and use are the top priority for funding and where the primary task of the teachers and lecturers is to provide learning frameworks which facilitate information literacy. Yet that is *precisely* what is required if the challenges of the 21st century are to be met convincingly. It was not for nothing that prominent Australian businessman Eric Mayer at our second national information literacy conference posed the question 'Whose job is it to convince teachers that information literacy is the key enabling competency for lifelong learning?' And it was not for nothing that Ida Silva in her article 'Information overload may be killing you' commented that '...there have been comparatively few resources put into educating people how to cope with the mass of information they are confronted with'.

The Candy Report

Another Australian government report which has made a major contribution to the information literacy debate in Australia is the 1994 *Developing lifelong learners through undergraduate education*, or the Candy Report. [23] This noted that compared with the United States and United Kingdom the transformation of Australia's higher education system had been marked by debates about systems and structures rather than about functions and purposes. It also observed that Australia is not alone in confronting the requirement for a more flexible and adaptive education system, and that other countries have tackled lifelong learning in a range of ways.

The Candy Report also commented on the extent to which the first aspiration of many of the clients of universities - for a vocationally relevant qualification - stands at odds with the deeper educational purposes of universities.

The report was extensively informed by the involvement of its main author Professor Phil Candy in our first national conference on information literacy. Information literacy as a concept, and as the critical competency for lifelong learning, is a feature of the report, it being noted that '...it was clear that librarians saw their role as undergoing major transformation as they themselves became agents for change within the university community'.

Also noted was that

> *...electronic databases and interlibrary loan systems have done much to bring learning resources to the fingertips of staff and students, but they have not obviated - if anything they have emphasised - the need for the library to be at the heart of learning. As libraries accept a more central role in the intellectual life of their institutions, they likewise become more pivotal in efforts to develop lifelong learners.* [24]

Professor Candy's interest in information literacy has resulted in him mentoring Christine Bruce, an academic at the Queensland University of Technology and the author of Australia's first PhD on information literacy which was published in September 1997 as *The seven faces of information literacy* [15] by Auslib Press. Bruce, from her study of the varying experience of information literacy by higher educators, concludes that there are seven different ways of experiencing information literacy and that it should be considered a major element in learning organisations as well as being a key characteristic of lifelong learners

The response of the Australian universities libraries

Not surprisingly, the response of the Australian university libraries to information literacy and their potential role as educational change agents varies. Some of those responses, by institutions such as Griffith University and Curtin University of Technology, are described well in the 1995 book *The Learning link: information literacy in practice.* [15] However, whilst all of the university libraries would accept a responsibility to promote information literacy as an issue, and to foster information literate students, the focus - as noted about the ATN libraries - is still on library literacy and library user education.

The current mission statements of the Australian university libraries are still largely confined to acceptance of a support role within the university, and the following is typical

> *In keeping with the mission of the University of........., the Library supports the teaching, learning and research of students, staff and the wider community by providing optimal*

> *access to information resources, irrespective of format or location.*

Some of the libraries do, however, refer to information literacy and lifelong learning in their objectives and goals, and two in particular have endeavoured to incorporate an educational vision in their lead statements.

The vision statement of the University of South Australia Library is

> *To be the university's key information provider in facilitating student centred learning, research and* ***information literacy*** *for lifelong learning*

Deakin University recast its mission statement in 1997 and adopted a widely used slogan 'we help people to learn'. Its mission statement now reads

> *The library will be pre eminent in providing information skills, services and resources for the university community to succeed in lifelong education*

These both seem to be worthwhile upfront assertions as the role of the academic library develops within what Maurice Line has described as universities changing from 'a system of teaching supported by libraries to a system of learning resources supported by teaching'. [25] The lifelong learning wagon seems a singularly appropriate vehicle to which all types of libraries should hitch themselves, and particularly academic libraries. Any university library which attempts into the 21st century the maintenance of a mission confined to 'excellence in the provision of information resources ' will lack credibility in the changing teaching and learning context of higher education, and will sell itself, its institution, and most critically its clients, short.

Robert Holloway from the Center for Excellence in Education at Northern Arizona University gave a paper at the second national Australian information literacy conference called *Information literacy: diffusion of an innovation*. The paper describes the diffusion of information literacy in the US, and Holloway comments that

> *The need to reach out, to 'sell' the construct to others, was clear...The criterion that was important was the value information literacy has for the user...Somewhat oversimplified, no one cares about librarians - but about what librarians or libraries can do to help meet specific needs. The goal was to convince others that the process of information had high utility.* [26]

Conclusion

Progress towards that goal has been made in Australia, and in my more optimistic moments I sense a common need and purpose is developing about this most fundamental of educational.

And it is fundamental, not just for Australia, but for all countries, including of course South Africa, because the recognition of need and the ability to access and use information critically and effectively allows three vital things to occur. To paraphrase Margaret Butterworth

- First, it is a prerequisite for participative citizenship
- Secondly, information literacy is required for the production of new knowledge, on which the future economic success of all countries depends
- Lastly, information literacy is needed to address global problems which challenge the planet and the survival of civilisation

The challenge facing Australian university librarians is just how to contribute to persuading their universities and their governments to a faster educational mindset shift which will recognise the issue and permit it to be addressed in a well funded, ongoing and pervasive way. One promising indicator for Australia is that in his opening address at the third national conference in December 1997 Mark Latham, the federal shadow minister for Education and Youth Affairs, and who has been suggested as a future prime minister of Australia, commenced by observing that

> *Information literacy and lifelong learning will give Australians the ability to survive and progress in a global economy of change, which is increasingly weakening the sovereignty of the nation state...Knowledge is information from every available source, analysed and targeted to needs. The skills for doing this are what we mean by information literacy.*

There is thus at least one senior politician in Australia who we have helped convince, and we do hope that you will all come to the IATUL Conference in the beautiful city of Brisbane in the year 2000 to discover further Australian progress in promoting and addressing information literacy as the educational *zeitgeist* of the 21st century.

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Initialisms and acronyms

AFIL Australian Forum for Information Literacy

ATN Australian Technological Network

ALIA Australian Library and Information Association

CALICO Cape Libraries Cooperative

CPPT Cooperative program planning and teaching

CUT Curtin University of Technology

ISAD Information society and development conference

QUT Queensland University of Technology

RDP Reconstruction and Development Program

RMIT Royal Melbourne Institute of Technology

TAFE Technical (or training) and Further Education

UNISA University of South Australia

UTS University of Technology, Sydney

Author: Alan Bundy

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Back to contents

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CONSORTIA LICENSING, INFORMATION AS INFRASTRUCTURE

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ABSTRACT

Scholarly publishing originated as the most efficient method for researchers and scientists to verify and communicate findings and to maintain the public records of research. This paper will argue that the growth of science and research from the 1960's, combined with the rationalisation of educational spending in the same period, has pushed the edifice of the scholarly journal to an extreme. The paper will suggest that the advent of digital publishing allows a re-evaluation of the role of the journal within research and education. The traditional subscription model has tended to treat research information as a commodity, while alternative models, such as the consortium model, linked to digital delivery, can provide primary research as an infrastructure provision.

Back to contents

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IATUL

TRANSCENDING CONVENTIONAL INFORMATION WORK: A STRATEGY FOR LIBRARIANS AND OTHER INFORMATION WORKERS IN AFRICA TO BE RELEVANT IN THE 21ST CENTURY

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ABSTRACT

Information and its communication have been central to the civilization of mankind since time immemorial. In Africa, until recently, though information has been recognized as a critical resource in the development process, the role of information workers, especially librarians has not been appreciated and librarians have largely continued to be seen to be irrelevant to the overall development process. However, with the developments in information technology, which are transforming an industrial age into an information-centered age, even in Africa, the value of information is moving to the center stage.

Like anywhere else in the world, libraries and information services in Africa are beginning to have greater diversity, credibility and creativity than ever before. But whether librarians and other information workers significantly seize the opportunity or not depends largely on whether they create the space to step back from their conventional information work to be able to put effort into discovering the skills of analysis and persuasion needed to shape an alternative vision of information services out of their experience of interacting with different information users. The challenge for librarians in Africa is to seek ways of maximizing their impact and of maximizing the value of lessons drawn from their experience without sacrificing the human face of their services.

Such kind of 'Scaling up' can be achieved by expanding activities and their outreach by helping community and national agents of change to initiate information programs and to coordinate their documentation efforts. But it can also be achieved by using their experience to persuade architects of development projects to change. They can urge community-based organizations (CBOs) and non-governmental organizations (NGOs) to integrate information activities into development projects so as to be relevant to the poor. They can advise governments to take specific actions that will integrate information into reform policies. They can persuade official aid agencies to modify their programs. And they can lobby internationally for libraries and information institutions in the North to make reforms in the global information regime so as to allow librarians and other information workers in Africa a more competitive edge. This new role calls for a conscious decision to move beyond a doing to an influencing role.

This paper presents a strategy for librarians and information workers in Africa to maximize their impact so as to be and remain relevant in the 21st century. Based on the experience of the Zambia Library Association (ZLA), this paper discusses the strategies the Association is using to become relevant to the Zambian community. The strategy does not just call for a fine tuning to the system to work better but to structural transformation, a transition to a new order, and new values predicated on the needs of the people, both today and in future generations.

Back to contents

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IATUL

LESS IS MORE - MORE IS LESS (MORE OR LESS) - CHALLENGES FACING HIGHER EDUCATION IN THE WORLD-WIDE VILLAGE

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ABSTRACT

This talk explores the changing world of teaching and learning and the impact which technology and learning have on each other. While technology is increasingly becoming an enabler for life-long learning, rapid technological change is demanding life-long learning. In this context, the problem is moving away from getting information towards filtering information. In this way, less information - but well targeted, is worth much more than more information less well aimed. This means that the role of the educator is shifting from being and information provider towards being someone who helps learners develop their information precessing skills. By the same token, those who work with managing information are faced with the challenge, not of providing as much information as possible, just in case, but with providing just enough information just in time.

Back to contents

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IATUL

CONSORTIA LICENSING, INFORMATION AS INFRASTRUCTURE

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Firstly, I'd like to thank the organisers of this meeting for asking Academic Press to participate in what so far has been an interesting meeting. Secondly, it gives me great pleasure to be one of the few scientific publishers invited to talk.

As we approach the end of this millenium and makes plans for the next, it is appropriate that we should question the practices and norms that have been with us for the past few decades.

What I would like to talk about today is Academic Press' vision of scholarly communication for the next millenium, a vision that has become a reality for many already.

At Academic Press we believe that the current model of scholarly communication, based on the submission of articles from authors to publishers, that are then sold back to libraries by journal subscription, is a model that can no longer survive.

The spiraling prices of journals that this model fosters is a disservice to all parties concerned - the author, the library, the reader, and indeed to the publisher. By focusing on scholarly information as a commodity to be sold, the scientific community has been forced to enter a crisis in communication, where library funding cannot keep pace with scientific output.

But of course this is not news to anyone here today, and I do not wish to dwell on the past, but look to the future and discuss how Academic Press are seeking to resolve this crisis.

The central concept behind our new way of thinking is that access to basic scientific information be seen as part of the "infrastructure" of any research or higher education establishment, and therefore part of the fabric of any society that values an educated and informed citizenry.

The word "infrastructure" instantly suggests a focus on technology, and of course it is by taking advantage of new technologies that we have the most opportunities for change and reform.

It is worthwhile briefly reflecting on previous changes in the dissemination of information and knowledge brought about by technical revolution. Steve Harnad notes that there have been "three revolutions in the history of human thought", those of language, writing and print. Through the technological innovation of the printing press knowledge was prised from the hands of the custodial guardians of "the truth" and made available for all. Harnad states that "we are on the threshold of a fourth" revolution - the notion of the "Post-Gutenberg Galaxy".

The fourth revolution that the internet is the driving force behind offers the chance to widen access to knowledge even further. At Academic Press we wish to provide a service where anybody who would like to use our published material can do so with ease, wherever they are, and still without money changing hands at the point of use. This applies not only to users at universities, but at public libraries, schools and commercial libraries too.

It is most encouraging to see that this philosophy is already prevalent in South Africa. Whilst preparing for this meeting I read with great interest the work that has already been done by the CALICO group in the Western Cape. It seems that we are sharing the exact same vision! To quote directly from the CALICO online brochure, "enhancing access throughout the wider community" will play "a vital role in providing the information network necessary for sound reconstruction and development of the region." Indeed CALICO has identified over 300 possible participants in their program of libraries at all levels in the community. Perhaps most important of all is CALICO's statement that "free information flow and access to information are also critically important to any democracy, and especially to South Africa's – in which many aspects of our social system run the risk of being continuations of the old order through lack of skills and capacity."

This approach is also being taken by the GAELIC group, of which the University of Pretoria is a member. The group states that in their planning they have "considered the entire library and information community in South Africa".

This national approach to library management exactly matches Academic Press' vision for scholarly communication, and its focus on the infrastructure of information provision.

So how specifically can Academic Press work with such consortia in achieving their aims? I'd like to discuss our models in a little more detail.

Our program consists of two elements: APPEAL, the new business model, and IDEAL, the electronic library of all 175 journals that we currently publish.

APPEAL is an acronym for Academic Press Print and Electronic Access License. It is important to note that our model concerns not only electronic access to journals, but print journals too. However our pricing scheme "uncouples" print from electronic access.

The basic premise behind APPEAL is that of aggregating spending to provide collective access to material. To use an example, if a consortium consists of 5 institutions, each subscribing to various Academic Press journals but collectively to all 175, an APPEAL license allows access to all 175 journals electronically by each of the 5 institutions. So an individual library may go from subscribing to 30 journals in print to having e-access to 175.

Most interesting, for library directors and vice chancellors in particular, is the fact that access to these journals is at 90% of the combined holdings of consortia members. Print subscriptions, which are entirely optional, are then offered at a deep-discount of 25% of the current list price.

An APPEAL license also relaxes copyright issues within the consortium. We will allow the photocopying and distribution of all material anywhere inside the consortium.

So we believe this approach taps into the very infrastructure of information provision, and indeed can provide more for less – a concept alien to the scientific publishing world a few years ago!

I would not like to go into more detail at this stage about out model, nor talk at length about the technical aspects of our electronic library, but return once again to the idea of widening access to information.

We are well aware that libraries require more than just Academic Press journals, and that users may search for information using a variety of databases and tools. As such , we have reached agreements with many third parties that enable searches for published material. Many of these services appear to already be in place in South Africa, through the SABINET service. For example, anyone using OCLC's FirstSearch or MedLine in their research can access the full-text Academic Press article if their institute has an APPEAL license. We have similar agreements with the American Mathematical Society service MathsNet, CHEMPORT, and BIOSIS amongst others.

Most interesting of all perhaps is our work with other publishers, particularly Wiley in the Digital Object Identifier project. This will allow linking from references in Wiley articles to references in Academic Press articles, and vice versa.

Of course for users to take full advantage of these services, as many points of access to the material need to be licensed as possible. This is our aim for a country such as South Africa. Indeed it is an aim we have nearly achieved in other countries in the world. For example, in Finland all universities and most polytechnics and research institutes have access to our material. Our next goal is to license all the public libraries in the country. In this way we feel we are truly changing information provision by providing access "on-tap" wherever it is needed.

So what is the next step for establishing this infrastructure in South Africa? It would appear that the philosophical issues have already been addressed, and the technological infrastructure is in place through SABINET and co-operatives like CALICO and GAELIC. The pertinent question of course is that of funding. Here we can draw experience from other parts of the world that already have APPEAL licenses.

In the United Kingdom, the Higher Education Funding Council provided a top-slice of total funding to pay for all universities to access our journals. In this way, the infrastructure was paid for before regular funds reached the universities themselves. We see this as by far the most preferable way of providing funds without directly re-allocating resources at the institute level.

The alternative approach is that of funding from the ground up, which could be a slower way to provide access to the widest group possible, and also more difficult from an administrative point of view.

By adopting this first approach, I would like to suggest that South Africa would be more than ready to move ahead in the provision of a national infrastructure for access to full-text scientific information. Although I am speaking on behalf of just one publisher, I am convinced that initial work with Academic Press will be just the start of taking the country into the next millennium as a place where a fantastic education can be had by all.

Thank you.

Back to contents

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Measure for Measure A Post Modern Critique of Performance Measurement in Libraries and Information Services

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INTRODUCTION

How can you determine the best way of measuring your library's performance? Which measures are relevant for you? Measure for measure, which measures will make your organisation more effective and responsive, and relevant to your client's needs?

As a profession we have been grappling with this question for a quarter of a century. Responses have focused on the semantic, the practical, the theoretical and the dogmatic. But in recent years they have focused mainly on the practical. Recent articles describe and explore new ways of evaluating services, new services to be evaluated, new issues to be considered. Terms like TQM, ISO9000, Servqual and gap reduction are thrown around. What do they all mean? How do they relate to each other? Few writers have questioned the fundamental value and relevance of the process of measurement itself.

It is in fact a difficult question, because it is self referential. If we could answer yes, and simply get on with ascertaining the best ways in which to measure and evaluate what we do, that would imply that we know what an effective library is, and can measure it. We would therefore be finding it easier to define and adopt library performance measures, and they would be telling us yes, measuring performance leads to better performance and therefore more effective and relevant libraries. The fact we are here debating these issues suggests that we have not yet reached that point. In fact, the question we must ask is: are we really any closer to knowing whether performance measures lead to library effectiveness than when the debate began twenty-five to thirty years ago? This is the approach I have taken in this paper, and I hope that it will help you to find an approach to performance measurement which will help you manage your library better, and use measurement to enable you to deliver a better service.

I have taken what is essentially a post-modern approach, which analyses the 'discourse' of evaluation, and deconstructs the certainties of the past. By 'discourse' I mean the language, the definitions, the ways of expressing the concepts of evaluation that we have used. In other words, the measures we use tell us, presumably, what it is we value in libraries. So that in analysing the 'discourse' and examining the premises on which we have built our notions of evaluation and measurement, we have an opportunity to re-examine those values. We are thus empowered to select and choose a system of performance measurement that suits the individual organisation and best reflects its fundamental purpose and its environment. Because, a library is a social construct, devised for a range of societal purposes and to meet a number of needs; library effectiveness is therefore dependent upon the insubstantial and fluid concept 'library', a concept which has become even more insubstantial in the age of the 'virtual library'. The attempt to discuss the notion of performance measurement in libraries is therefore both frustrated because of its complete dependence on such relativistic foundations, and necessary, because in the midst of such uncertainty we must attempt to create some meaning. The discourse of performance measurement is one way to establish that meaning.

Post-modernism and libraries

A post-modern analysis finds that words, symbols, and signs are increasingly divorced from direct real-world experience. For example, the world of catalogues, call numbers, collection management and bibliographic control may have no meaning in the age of the 'virtual library' with its electronic journals delivered on demand, and its 'virtual collection' of electronic documents, stored in another continent and accessible on a "just-in-time", rather than a "just-in-case" basis. Post-modernism challenges the knowledge of the past by challenging the assumptions of the scientific rational method, and by rejecting the grand all-encompassing theory, such as, theories of universal bibliographic access and universal bibliographic control. Postmodernism, rather than seek to determine models which will serve for a universally recognised paradigm of 'library' focuses on local and transitory meanings, which serve for a time, and then are discarded when they no longer have relevance. It challenges definitions, and social constructs, and asks "what do we mean by 'a library'"? and "do you mean by 'library' what I mean by 'library'?" and if you don't then how can measures that determine the effectiveness of your library be of any value to me trying to measure the effectiveness of my library?

Ron Day would go so far as to say that library science as a discipline has been confounded from the outset by the fact that its very domain of study "information" is intricately linked with our concept of the nature of science, of the certainties of empiricism, and structure of recorded knowledge. (Day, 1996). Thus, the library, with its authority, structure and systems for organising knowledge might be seen as the scientific, modernist, certainty of the past. The Internet, by contrast can be viewed as a truly post-modern environment. In fact it has been described as 'the working model of post-modernism' as proposed by Lyotard (Hubbard, 1995: 448). Eschewing the certainties of print publication, the authority of peer-reviewed journals, and the certainties of empirical research, it mixes the scholarly and scientific with the egregiously spurious. Without the imposed orthodoxy of the world of scholarly publishing and libraries it reduces everything to everything to a common denominator in which the surfer is king, and meaning is imposed by structures outside its own boundaries- by the constructs we bring to it.. In this context we are forced to redefine the nature and purpose of libraries, and consequently the framework of evaluation and measurement we will bring to them.

The paper therefore addresses the central question of the relevance of measurement and evaluation in libraries and information services by :

- examining past and present approaches to performance measurement in libraries
- putting past and present practice into a conceptual framework
- defining effectiveness as a multi-dimensional construct
- identifying the factors necessary for the effective application of performance measurement in library and information services

PAST AND PRESENT APPROACHES TO PERFORMANCE MEASUREMENT

Origins of measurement in libraries

Performance measurement or evaluation has historically been used by library and information services in two ways. From the Great Library at Alexandria up until the present day, libraries have judged themselves and each other in terms of their collections and their curators. The pride taken in the early years of this century in the size and quality of the collection, often focused on the number of rare and valuable items it contained, and the distinction of the staff as scholars and luminaries in their own right, has dominated much library history. This view was challenged by the documentalists of the nineteen thirties and forties, applying the mathematics of stochastic processes to the circulation of books and information in library systems. They began to shift the focus from the collection to the processes going on within the collection and the interaction between the collection and its users. The science of bibliometrics and the understanding it brought of the library as part of the cycle of the creation, organisation and dissemination of knowledge, changed the concept of the library as a self-contained entity to a dynamic system in constant interaction with its environment.

As this understanding developed, and as the library became a more sophisticated operation, standing apart from the community of scholars or readers which it served, it became recognised as a social institution rather than a collection of materials. Principles of management, and principles of evaluation developing in the management literature, were now perceived to be applicable to libraries. Performance measurement in library and information services has since kept pace with the range of methodologies used in the profit, and not-for-profit sectors—Strategic Planning, Systems Analysis, Management Information Systems, MBO, TQM, BPR, ISO9000 and its off-shoots, and the Baldridge Award. We have flirted them all and engaged seriously with some.

More recent developments reflect the role of government, and the impact of developing principles of 'accountability' in government on libraries, a large proportion of which are owned by national, state, or local government or government agencies. The New Zealand government, for example, currently declares its social and financial goals as Key Result Areas, and Strategic Result Areas and reports annually on the extent to which these are achieved. It has become an international leader in the development of methodologies for measuring the effectiveness of government, and on ways to define the services it purchases on behalf of the community from provider agencies, such as universities and libraries. (Boston, 1996). We will need to see where such developments fit into our analysis.

What does emerge from these various approaches to measurement and evaluation are a set of fundamental premises about measurement. The methodology is of less significance than the fact that some organisational endeavour is given over to the measurement of performance. Two key principles then can be seen to be:

- that the organisation seeks feedback on the impact of its main endeavours, i.e. that the feedback loop is closed
- that the measurement of performance is tied to decision-making and resource allocation.

Within these parameters there is a large element of choice, and an organisation may focus its measurement on a range of activities.

But this still begs the question: What is effectiveness? How do we measure it? If we do, do things improve? The debate in our profession, I would suggest, has focused too much on semantics and process, and too little on outcomes. The questions we should therefore be asking are:

- what performance measures are libraries and information services using?
- what are these measures actually measuring ?
- can libraries and information services demonstrate changes and improvements in procedure and resource allocation as a result of using these measures?

Landmarks of the past

One way of answering these fundamental questions may lie in a more clearly defined conceptual framework for the process of output measurement, the measurement of outcomes, and the evaluation of services.

In order to develop such a framework we need to go back to some of the landmarks of the past 30 years, 30 years of an extensive literature to which we have already briefly referred. Here are some notable pieces of work, glimmerings of real knowledge in the research literature, in monographs, in conference proceedings, in handbooks and manuals - a "massif" with some named peaks - research, methods, and insights, which have added to the debate, changed its direction, made some significant impact on thinking about the issue. (See Appendix). This is not by any means a definitive list, even of the acknowledged seminal papers, or 'landmarks'. It is used simply to point out some trends. But most names of note are included, especially those of Kant or, and Orr, two key figures who made significant conceptual breakthroughs that are only beginning to be fully explored. And some are briefly mentioned who are far more prolific than this list suggests, especially major figures such as Buckland and McClure.

Of note in this list is a progression from the early documentalists, using statistical methods to analyse patterns of use in library collections, developing concepts of measurement, early applications of the 'systems' approach, identification of need for 'objective' measures, linkage of planning (and goals and objectives) with measurement, the concept of 'goodness' and whether statistics can measure goodness or not, the emergence of 'effectiveness', MIS and DSS, and finally the introduction of concepts of quality, ISO9000, the distinction between satisfaction and service quality, and the definition of the attributes of service quality.

During this period (the past 25-30 years) we have learned a lot about library performance and measurement. We have learned to distinguish between inputs and outputs, to understand the difference between measuring processes, and measuring products. We learned about the need for feedback. We have learned also that outputs may not equate with outcomes, and that to find out how well we are doing we really need to determine what impact library and information services have on the immediate community we work in and on society at large. And then we leaned that these outcomes are more difficult concept s to measure than inputs or outputs or even processes. They are fuzzy, contradictory and often unquantifiable. Our state of knowledge might be simply expressed thus:

Evaluation

feedback

inputs	processes	outputs	outcomes
resources	performance	customers	??
(human/ financial etc)	measures	service quality	satisfaction

Figure 1. The three aspects of evaluation

A CONCEPTUAL FRAMEWORK FOR EVALUATION

A typology of the performance literature

A more sophisticated typology which has been used in our discipline provides some insights into why there is such a range of evaluative methodologies, and how they relate to each other. Advantages and disadvantages of each can then be assessed and choices made as to which method is the more appropriate.

This typology, as it is used in Library and Information Science, and other educational and quasi-governmental industries is generally attributed to Kim Cameron. Although it is usefully applied to the not-for-profit sector, since it provides other ways than profit for measuring organisational effectiveness, it originated in the for-profit sector and is found in a number of management textbooks, with various attributions. It was used by Van House and Childers (and subsequently by Calvert and Cullen) in a series of studies which now amount to a substantial body of replicable research on dimensions of library effectiveness.

In Cameron's typology (Cameron, 1986) there are four models which describe the ways in which organisations tend to measure their 'effectiveness'. They are referred to as:

- the goal attainment model
- the systems resource (or external systems) model
- the internal processes, or internal systems model
- the multiple constituency, or constituency satisfaction model.

In the **goal attainment model** the organisation assesses its effectiveness in terms of the extent to which it achieves its goals and objectives. These may be focused on acquiring resources from the environment, increasing outputs, or establishing new services. Reporting and measurement, and resource allocation are concentrated on the extent to which these goals are achieved. Goals may also be focused on achieving pre-determined standards or bench-marks. Heavy reliance on output measures usually indicate that much of the organisation's endeavours are focused on increasing outputs, and therefore on goal achievement.

In the **systems resource (or external systems) model** the organisation measures its effectiveness in terms of its ability to gain resources from its environment. These are input measures. Traditionally, as we observed above, libraries have concentrated on, have measured themselves and reported in terms of: the size of the budget, number of staff, number of qualified staff, staff publications, the size of the collection, strengths of the collections, etc.. Successful libraries have been considered to be those which secured more extensive resources from the environment, and translated them into these ostensibly desirable inputs. Library statistics, and benchmarks of minimum staffing levels for a particular population, building standards and area per capita for users, staff qualifications, collection size etc., reflect this model.

In the **internal processes, or internal systems model**, the emphasis is on the organisation's internal communications systems, and the efficiency with which it converts inputs into outputs. A feedback loop is an important component of this model. Measures which report ratios of transactions per staff member, number of items added to stock per staff member, and early work on the use of library statistics for decision-making focus on this model. TQM and the use of the quality standards (ISO 9000/9001, etc.) , because the focus is as much on internal as external transactions, can also be identified with this model.

In the **multiple constituency, or constituency satisfaction model**, the organisation looks outward to its different constituencies or stakeholder groups and measures its effectiveness in terms of the extent to which the needs of these different constituencies are met. The competing demands of these various groups must then be managed. Goals and objectives, and all other ways of measuring performance are constrained by the need to demonstrate to the more powerful constituencies the extent to which their desires are met. This is essentially a marketing model, and one that recognises the need for marketing to the internal as well as the external customer.

Organisational effectiveness can therefore be seen to be a mental construct of many dimensions. Although organisations may not identify or articulate the model they have chosen, their choice can be inferred from their behaviour. Organisations may of course employ one or more of these models, in that the measures they select for use, or the way in which they report reflect more than one of the models outlined. The corollary is that as some of these models are mutually contradictory, effectiveness measured according to the dimensions of one model may not be compatible with effectiveness as measured according to the dimensions of another.

We can now map the range of methods of performance measurement used in the examples in our 'landscape' onto this typology. It would be preferable at this stage not to use terms like 'measurement' and 'effectiveness' because these are semantically compromised by their previous usage. The term 'evaluation' is used for the typology, because it is sufficiently broad to encompass all the models that have been used. Figure 2 represents an initial and tentative mapping. It is not our final model.

Evaluation

Goal attainment model:	goals and objectives bench-marks standards output measures citizen's charter
Systems resource model:	Input measures library statistics bench-marks standards
Internal systems model:	Management Information Systems Decision Support Systems TQM- Total Quality Management ISO9000/9001 etc.
Multiple constituencies model:	Service quality Customer satisfaction Total Quality Management ISO9000/9001 etc. gap reduction marketing

Figure 2. Systems of evaluation used in LIS mapped on to Cameron's typology

There are some caveats relating to the use of this typology which must be mentioned here. The four models do not deal very adequately with the notion of outcomes (or impacts) , as distinguished from outputs. This is problematic for me in that the notion of outcomes has dominated much of the New Zealand government' s thinking in the past decade - a cost/benefit approach, or an attempt to measure the benefits of social service agencies in terms of social outcomes that is still in its infancy. Although if the government could precisely define the social benefits it desired, and was willing to fund these, it is possible that ways could be identified to deliver and measure them.

Cameron's typology also does not deal well with the concept of leadership, which I will argue may be essential to the implementation, if not the conceptualisation of measurement. It should also be noted that there are some recent evaluative paradigms which straddle a number of the models here, and which bring a more sophisticated multi-focused approach to performance measurement, being both internally and externally focused. The Baldridge Award and its framework of criteria would be one such. It does not yet appear to have been adopted by any libraries or information services.

As we move towards building a new conceptual framework that will accommodate the various endeavours of measurement of the past, and the Cameron typology, it is salutary to look one other model. Hernon and Altman, in Service Quality in Libraries (Hernon, 1996) distinguish 5 dimensions of evaluation: extensiveness, effectiveness, efficiency, costing, and quality. These can also be mapped on to the four models of effectiveness that we have already looked at:

Dimensions of evaluation	Fit with "Models of effectiveness"
Extensiveness	Internal processes External systems Goal attainment
Effectiveness	Goal attainment
Efficiency	Internal processes
Costing	Internal processes External processes
Quality	Multiple constituencies

Figure 3. Cameron's typology mapped onto Hernon and Altman's model of evaluation

In this paradigm, extensiveness, e.g. the 'extent' or 'amount' of inputs, of users, of time taken to process materials, or of services provided, is a quantitative not a qualitative measure. It relates to both the internal processes, or systems model, and to the external resources model, since it covers both the efficiency with which an organisation can convert inputs (staff, funding etc.) into outputs (reference enquiries dealt with, etc.) , and it also measures the organisation's ability to secure more such resources from the environment. If an organisation chooses to focus its planning activities on measurable objectives , it will be focusing its evaluation around the 'extensiveness' dimensions, rather than choosing to focus on other dimensions.

Hernon and Altman focus on quality - the extent to which an organisation meets the needs of its primary customers as defined by a range of service attributes - as the most significant dimension of evaluation to which libraries should currently direct their energies. However, the Hernon/Altman typology, like Cameron's, reveals that an evaluative methodology which reflects only one dimension will ignore many other dimensions of effectiveness, or evaluation, which must betaken into account to give a true picture of how a library or any other service organisation is performing. This 'fore-shortened', uni-dimensional view may be a factor in the reluctance of libraries to whole-heartedly endorse measures proposed to date. An instinctive desire for a more 'holistic' approach to measurement that captures something closer to a truer picture of that complex social construct, the library.

A proposed new model of organisational effectiveness: a Focus/value/purpose matrix The real value of Cameron's work, and that of Van House and Childers, is to demonstrate the multi-dimensional nature of performance measurement. Studies carried out by Childers and Van House investigating dimensions of effectiveness in public libraries, further explored by Calvert and Cullen in public and academic libraries, and by McDonald and Micikas in university and college libraries, all tend to produce the same broad range of results—that library performance can be shown to have a range of about 12 dimensions, covering management procedures, technical processes, physical plant, information/customer services etc. each of which is important to the whole picture, and each of which fits within one or other of the models of effectiveness outlined by Cameron [1].

The four models, however, can also be seen as an expression of a number of different poles or axes. One dimension, representing a set of organisational attributes (such as 'customer focused', 'client-centred' [2], or conversely 'unresponsive') is clearly the internal/external focus of the organisation. This axis is an expression of the degree to which the organisation focuses on and interacts with its environment. An organisation with an internal focus will look at its internal processes, and measure its efficiency in converting inputs to outputs, but will pay less attention to defining these and to their relevance to its ultimate purpose.

This, then, is our first axis.

Internal focus ———————————————— External focus

Diagram 1

A second axis reflects the value system of the organisation. The attributes on this axis reflect the extent to which the organisation places value on its inputs (i.e. its size, and the extent of the resources it attracts), or its outputs (the services it provides) to a range of customers. Despite our profession's focus on the measurement of outputs for the past fifteen years, many organisations continue to report inputs and clearly place great store by them. Even organisations striving to be more customer focused are still reporting and valuing inputs, suggesting that these two axes measure different sets of organisational attributes.

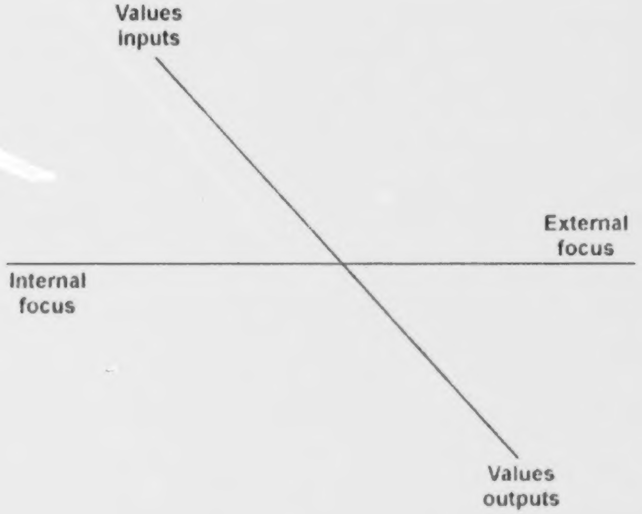

Diagram 2

However, organisations with a strong sense of their value in terms of outputs, and a strong external focus are likely to be highly sensitive to political issues in the environment, and to favour models of effectiveness which reflect their multiple constituencies. They are likely to a adopt a marketing model.

We commented earlier on some organisational attributes that the Cameron models deal with less effectively. These are attributes such as purpose and leadership. We can add a third axis therefore which measures the extent of the organisation's resolution. Resolution is here defined as that aspect of organisational culture which reflects organisational unity, a sense of common purpose and movement towards that purpose. It is also a measure of the strength of leadership within the organisation, leadership that encourages change, and that shifts resources to defined goals. Organisations weak in resolution will tend to maintain the status quo and resist change. Their performance measurement is likely to be focused on existing activities and outputs. Feedback loops may exist but the information they provide will not be the major input in decision-making and resource allocation. Strong leadership, and a change in organisational culture is needed to re-orientate such an organisation to new goals. A third axis, relating to the strength of organisational purpose, is therefore added to our matrix which now represents a tri-axial figure which may be labelled a Values/focus/purpose matrix. This third axis is critical to the successful implementation of performance measurement.

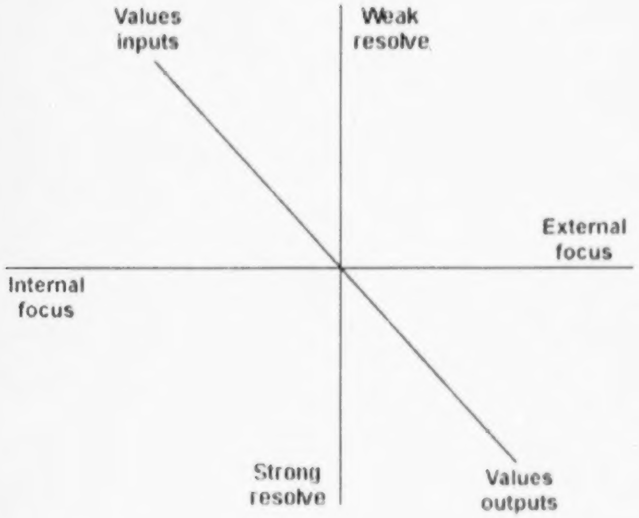

Diagram 3

The distinction between the three axes is important. An organisation which is strong on resolve and has strong leadership might still not have a very strong customer focus. It might focus on its inputs, its collections, its buildings and on gaining yet more resources of this kind, while neglecting to examine and increase its outputs. Conversely, an organisation with a strong customer focus may fail to pay attention to, and fail to succeed in gaining the resources which will enable it to meet its customers' needs. A third organisation might value its outputs, report on all its transactions, e.g. circulation statistics, reference enquiries, interloans, on-line searches, etc. and set goals to increase these each year, and yet have little notion of whether these transactions are meeting the needs of is primary client groups, or indeed have defined its primary clients or customers.

Where an organisation sits on each of these axes is as much a matter of choice as a function of its history and organisational culture. But while some libraries are reinventing themselves, and refocusing energy on a range of service outputs, other seem almost to be trapped by their own histories. It is in the end a matter or choice. And for an organisation which wishes to shift where it sits on the axes representing values and focus, the axis representing purpose becomes critical.

Like the typology employed by Cameron, the Values/focus/purpose matrix helps us see the relationship between various systems of performance measurement an devaluation. It emphasises the complex and multi-dimensional nature of organisational effectiveness, and therefore of the task of performance measurement. But the Values/focus/purpose matrix demonstrates even more clearly than the Cameron typology the element of choice and purpose that is fundamental to performance measurement. Every organisation can reposition itself on each of the three axes as it determines its relationship with its environment, its focus and its values.

FACTORS AFFECTING THE USE OF SYSTEMS OF EVALUATION

Do libraries make use of past research?

Turning now to the fourth avenue by which we set out to address the question of whether performance measurement improves library effectiveness, i.e., by examining the factors that might improve or hinder the adoption of performance measurement in library and information service management, one•question immediately arises. In all the literature that we have been discussing here there have been considerable insights into measurement and its value to libraries. Why has there not been greater uptake of this scholarship and research? Why is there so little agreement amongst the profession at large of the best approach to take to this problem, when library services are in so may other ways are becoming more and more standardised?

There has, in fact, been some uptake of researched-based management methodology within our profession in the past. From the first ALA manual (De Prospo, 1973) through to the last (Van House, 1987) the methodologies have been well based on previous investigation and research, even if this was not entirely empirically based. Those libraries that have employed these or related methodologies report detectable increases in a range of output areas (Stephens, 1995) and some satisfaction with evaluation as an activity. But total commitment in the profession to the task seems to be still falling far short of what we might expect after such a lengthy gestation. In most institutions, it seems, measurement is still not feeding into the planning process; many libraries have little understanding of the measurement process, pay little heed to research, and few are able to document improved outcomes from their evaluation.

Compared with other disciplines, it could be said, we do not make enough use of research to improve services or practice. A revealing comparison might be made with medicine. Despite political issues surrounding the delivery of medical care medicine is a highly professional discipline that uses its research and its literature to inform practice-there is a lot at stake, and the health professionals can't afford not to use the best information available.

What is different about library service, and about information services generally? Do we see the same uptake of information from research? the same focus on improvement? the same awareness of the risks of inaction? If we go back to the 'peaks' in our landscape , and pick out some of the notable research and the breakthroughs of the past that could have changed professional practice, we have to ask to what extent have they changed anything? What impact has the work of Orr? of Kantor? of Altman? or Van House and Childers had? Well, obviously we do see changes, and we do see improvements. The academic library of today is more sophisticated, and offers more services than 25-30 years ago, when the first investigations to which this paper refers were conducted. Two notable changes have been in the area of reference services and Information Technology (one we can take credit for, the other possibly not). But are these the result of utilisation of research, a conscious attempt to use data and feedback to improve services? It seems that many of our improvements are ad hoc, rather than empirically based; they are reactive, i.e. responding to changes in the environment, or they originate with vendors driven by the need to get a competitive advantage, rather than being proactive, and led by the profession itself.

Why? There are two possible reasons:

1. The incentives aren't strong enough - information management and services are rarely matters of life and death; they don't have to make a profit, satisfy shareholders, and until recently rarely had to prove their value.

2. In attempting to measure library/information service performance we are dealing with some very imprecise outcomes/impacts - it is not always clear what is the 'best book' especially for a particular client, the 'best information' or even the most up-to-date - no research will tell us this. The outcomes we talked of earlier, the social impacts, have not yet been defined adequately. Only in the business environment has there been any attempt to define the cost/benefit of the information service to the organisation. Our profession involves a complex area of human behaviour, we are uncertain of the benefits, and unlike medicine, we can't measure the value of our work - or the negative impact if it is done badly.

In sum, as a profession, we have not embraced performance measurement in the decisive way that we have adopted technology. Clearer benefits might provide clearer incentives, and the combination of inadequate incentives and fuzzy outcomes has led to a level of uncertainty and indecisiveness in action. But it is the first that interests me most for the time being, the question of incentives.

CONCLUSIONS

There would seem to be three critical factors influencing the positive outcome of performance measures in libraries. The three factors are inter-related, and form a useful framework for a final discussion of the issues.

1. Measurement is a political activity
Performance measurement is a highly political activity, and must be seen as such, at the macro and the micro level. We must look outwards to social and political expectations made of our institutions and ensure that they meet the needs and expectations of our significant client or stakeholder groups; we must use our planning and goal-setting activities in a meaningful way, incorporating appropriate measures, to demonstrate our response to this external environment, and our willingness to align our aspirations to broader corporate goals. But we must also look within and seek to promote an organisational culture which acknowledges the political nature of measurement. This means using performance measurement to:

- indicate the library or information service's alignment with broader organisational goals,
- demonstrate the integration of information services with the key activities of the organisation, or of the community
- support the library's position as the organisation's primary information manager and service providers.

Returning to the Values/focus/purpose matrix a library or information service wishing to define itself in this way will be careful to direct its energies and its performance measurement towards the outputs end of the values axis, choose an external orientation and develop a strong sense of purpose.

2. The Multidimensional nature of performance measurement
The application of Cameron's four models to existing modes of measurement and the Values/focus/purpose matrix have demonstrated that performance measurement is fundamentally multidimensional in nature. A library or information service that wishes to really understand how it is performing will examine both its environment and its constituencies, investigate the needs and expectations of its constituencies, examine its inputs and effectiveness in gaining resources, set goals which will allocate resources to respond to its various constituencies, measure efficiency and effectiveness in using resources, incorporate feedback into planning, revise goals in dialogue with various constituencies identified. You might describe this as the old systems model. It is far more than that. All four models outlined by Cameron must all be reflected in the evaluative procedures employed by the institution. It must recognise where it sits and consciously position itself on each one of the axes of the Values/focus/purpose matrix.

3. Rewards and incentives
Finally, we will not see informed and effective performance measurement in libraries until we can have got the right incentives in place . Again, these are both external and internal - they include the incentives and demands made by governments, local bodies, funding agencies, and parent organisations to provide evidence that the organisation is setting appropriate goals, meeting the expectations of a variety of stakeholders, and efficient in its conversion of inputs to outputs. And they include the incentives offered internally to reward good performance that is in line with organisation's objectives. In too many of our institutions poor performance is inadvertently rewarded, and good performance goes unacknowledged. An organisational culture is ideally attuned to the organisation's purposes, and reflects the resolve of the organisation in whichever direction that takes it is. Again the organisation must consciously place itself as an organisation of strong resolve on the purpose axis of the Values/focus/purpose matrix.

The question reput: a post-modern analysis
We began this discussion by observing that the concept of 'library' and therefore the concept of 'library effectiveness' is a social construct which allows us to impose a discourse with which to define and discuss the concept. And it was suggested that the question of whether performance measurement improves library effectiveness is essentially unanswerable, because it is self-referential. But perhaps in this exploration of past and present approaches to measurement, and in the two multi-dimensional conceptual frameworks we used to define the problem, we can find an answer of sorts. Because this exploration has shown that since a library is a social construct, and performance measurement is a consequent social construct, we are then free to both explore the definition of 'library' being imposed by any one system of measurement, and to chose which definition of 'library' to employ. That is we can adopt a system of measurement which best serves our definition and our purpose. The numerous dimensions of performance measurement encompass a range of methodologies and paradigms. Each has

its own perspective on what a library is about to bring to the task. Each has its own internal principles, and imposes its own discourse.

Libraries, and other organisations for that matter, in choosing between these various paradigms, are able to determine their placement on the three axes of the Values/focus/purpose matrix, are free to do so and must choose where and how to do so. There are no absolutes, so gurus to follow, no guarantees. Should they choose to focus their energies and their measurement on improved organisational effectiveness then that is likely be the outcome.

We have known all this for the past decade. As Chuck McClure said in his 1986 'Report from the trenches' what is needed are reliable methodologies, but even more so the professional leadership and organisational development. to make measurement an effective tool for libraries(McClure, 1986). A decade later we are still looking for new paradigms, testing new methodologies when they are already there. Performance measurement is an essential management tool, that may be implemented in a variety of ways. Each brings some desirable outcomes and comes with some disadvantages. Understanding the nature of each paradigm, and the underlying concept of the organisation which it implies, will help us make more effective choices from this range of methods. With this understanding, and with the leadership and organisational resolve to use measurement as a tool to increase organisational effectiveness, the possibilities are endless.

The question may be self-referential. The answer I have outlined will, I hope, help you identify relevant and meaningful measures for your own library/information services.

Notes

[1] A scond important characteristic of this research, again demonstrated by Van House and Childers, and Cullen and Calvert, is the potential to select with confidence a single measure from each dimension as a "surrogate" for other measures in the same dimension. This means that parsimonious measures to be selected which still covers all dimensions of library activity and evaluation (Cullen and Calvert, 1996).

[2] Of course many organisations may continue to be unresponsive to client needs whilst claiming to be client-centered. In such a case 'client-centered' remains an aspiration not an attribute.

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MEASURE FOR MEASURE

APPENDIX

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Back to contents

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THE KMAT : BENCHMARKING KNOWLEDGE MANAGEMENT

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Knowledge management is a discipline that promotes an integrated approach to identifying, managing and sharing an organisation's information assets, including databases, policies and procedures as well as unarticulated expertise and experience resident in individual workers [5]. The term knowledge ma-nagement is used in the corporate world to differentiate between management of content (knowledge management), management of records (records management) and management of information tech-nology and systems (referred to, incorrectly, as information management) [9].

Consulting firms make money by consulting on knowledge management. However, they also save their clients money and time by helping them to share knowledge effectively, so that the work they do in different divisions, branches or countries, doesn't have to be redone by others.

The knowledge management trend seems to be catching up with its terminology, as we no longer manage only information, but also knowledge. In the corporate world, employees are sharing their thoughts in discussion databases using Intranets or groupware packages, with the Knowledge Manager acting as a facilitator. Project experiences are captured in databases that are accessible to con-sultants world-wide. The lessons learned on these projects can help others when they implement similar projects. Databases with employee profiles help consultants to draw on the know-how and skills of others around the organisation. This, we believe, is managing knowledge in the true sense.

In this paper, we will make reference to the latest terminology, namely the term knowledge manage-ment for information management, knowledge services for library and information services, knowledge centres for libraries, archives and other information centres and knowledge workers for librarians, archivists or other information workers.

According to Thomas Davenport, Director of the Information Systems Management Program, University of Texas at Austin, "Technology, by itself, isn't going to revolutionize knowledge management. The question is 'Does the organization share knowledge well?'" [7].

How can educational institutions measure how well they share and manage knowledge? Arthur Andersen's "KMAT" (Knowledge Management Assessment Tool) is a *benchmarking* tool that can direct institutions toward areas that require more attention and identify knowledge management practices in which they excel.

Benchmarking implies the setting of goals by using objective, external standards and learning from others – learning how much and how [2]. A knowledge centre can use benchmarking to measure and compare their processes with those in other knowledge centres. The knowledge centre's performance can be increased by adopting the best practices of the knowledge centre's benchmarking partners [8].

According to the "Software report", published in April 1998 by Interactive Information Services, finance, information technology and marketing departments in many organisations are fighting each other for responsibility to manage the company's information [10]. One would assume that those same organisations would have decided by now whose responsibility it is to look after their information needs. Surely, this should be the task of neither finance, information technology nor marketing departments, but of knowledge workers. Knowledge workers are also ideally equipped to benchmark knowledge manage-ment within the institution.

The measurement of specific operational procedures and personnel within knowledge services, divisions or departments is a way of obtaining feedback. Knowledge services need to determine their effectiveness in order to obtain financial assistance needed for their services, as the authorities that provide funding need to be convinced of their effectiveness and the appropriateness of their objectives [11].

The benefits of benchmarking to the knowledge worker are that management can be shown the value of the knowledge management function in numerical terms. It shows that the knowledge worker is proactive and devoted to *total quality*. Benchmarking can help to set realistic, quantifiable goals based on superior knowledge service practices. The results from the study can be used to prevent a budget cut or knowledge service outsourcing. Benchmarking can help to increase the knowledge service's performance and improve its work processes. Benchmarking can result in a reduction of costs, improved customer service and increased system efficiencies. These improvements can help the knowledge service to attract new customers while retaining old ones and can enhance the reputation of the knowledge worker [8].

There are different methods of benchmarking available to knowledge workers. We will discuss some of these below.

Competitive benchmarking entails measuring your functions, processes, activities, products or servi-ces against those of your competitors and improving yours so that they are better than those of your competitors. Competitive benchmarking is the most difficult form of benchmarking, as target compa-nies are usually not interested in helping the benchmarking team [2].

In cooperative benchmarking, an organisation that desires to improve a particular activity through benchmarking, contacts best-in-class firms who are usually not direct competitors of the benchmarking company, and asks them if they will be willing to share knowledge with the benchmarking team [2].

In collaborative benchmarking a group of firms share knowledge about a particular activity, all hoping to improve based upon what they learn. A third party often serves as coordinator, collector and distributor of data [2].

Internal benchmarking is a form of collaborative benchmarking that many large organisations use to identify best in-house practices and disseminate the knowledge about those practices to other groups in the organisation [2].

The Knowledge Management Assessment Tool (KMAT) is a collaborative benchmarking tool, designed to help organisations make an initial high-level assessment of how well they manage know-ledge. The intention of the KMAT is not to do competitive or cooperative benchmarking, but to do collaborative or internal benchmarking.

Completing the KMAT can direct organisations toward areas that require more attention, as well as identify knowledge management practices in which they excel.

Three types of comparison reports can be generated using the KMAT. External benchmarking compares an organisation with the overall (multi-industry) KMAT database or a smaller customised group. Internal benchmarking compares an individual or division within an organisation with a group of their peers who have also responded to the KMAT. Average benchmarking compares the average of a group or individuals within an organisation with the overall KMAT database, or a smaller customised group (combines internal and external comparisons).

Ratings include performance and importance ratings. The results are interpreted according to a matrix with four quadrants indicating start, stop, improve and continue and prioritise and select.

The KMAT, which is based on an organisational knowledge management model, proposes ways that four enablers (leadership, culture, technology and measurement) can be used to foster the development of organisational knowledge through the knowledge management process. The model places all of the major knowledge management activities and enablers together in a dynamic system [6].
Each of the five sections of the tool - leadership, culture, technology, measurement and process – encompasses a set of knowledge management practices. Educational institutions can have their perfor-mance rated and benchmarked with those of other institutions for each of 24 practices [6].

Leadership practices encompass broad issues of strategy and how the organisation defines its business and uses its knowledge assets to reinforce its core competencies [7]. Knowledge management needs to be hooked directly into the way the organisation is managed [4].

Arthur Andersen 1885 - 1947

Our leaders have identified that the knowledge or know-how of our consultants is the product we sell. Similarly, technological universities sell the knowledge or know-how of their employees, rather than degree certificates.

Technology practices focus on how the organisation equips its members to communicate easily with one another, as well as the systems it uses to collect, store and disseminate information [7].

The danger lies in over-investing or under-investing in technology. By over-investing one places technology ahead of the ability or the desire of people to use it, where the investment only acts as a balance sheet drag and becomes obsolete. There is no question that technology can assist knowledge management and one should guard against under-investing or waiting too long, because nay-sayers might fear that a new technology will come along tomorrow [4].

At Arthur Andersen, there is a strong commitment to technology. Our virtual communities communicate via groupware. We have also developed an extensive Intranet called the KnowledgeSpace. We have spent a quarter billion American dollars on information technology within one year. 65% of our capital is invested in information technology, leaving 35% for other capital expenses.

Culture practices reflect how the organisation views and facilitates both learning and innovation, including how it encourages employees to build the organisational knowledge base in ways that enhance value for the customer [7].

In some organisations, knowledge is not shared, because rewards, recognition and promotion go to those with knowledge, not those who share knowledge [4]. At Arthur Andersen, knowledge sharing is part of the performance review criteria and employees are rewarded according to the quality and quantity of information they've fed back into the knowledge management system.

At some organisations, employees are not in the habit of sharing, as they don't realise that what they have learned may be valuable to others in the organisation. Often, they don't know how to share knowledge or who to share it with [4]. At Arthur Andersen, a lot of electronic correspondence and discussion takes place and reports are generated and distributed electronically, via user-friendly technology, saving consultants time and effort. With the help of the knowledge coordinator, they soon learn how to source the information they need and how to contribute relevant information.

Measurement practices include not only how the organisation quantifies its knowledge capital, but also how resources are allocated to fuel its growth [7]. Knowledge is very hard to measure, due to its intangibility. GAAP accounting principles do not recognise it as an asset unless an organisation purchases it. Organisations view knowledge as one of their most important assets, but on their balance sheets it is usually expensed, not capitalised [4].

Arthur Andersen has done a lot of research into knowledge measurement. We have developed tools such as the KMAT and the "Organisational learning inventory", and conducted surveys, such as the "Knowledge measurement survey". The European survey on knowledge measurement attitudes and practices was published recently, while the survey is currently being distributed in the United States and Canada. We plan to distribute it in Asia in the near future.

The knowledge management process embraces the action steps the company uses to identify the information it needs and the manner in which it collects, adapts and transfers that information across the organisation [7].

Competency centres are at the heart of the knowledge management process at Arthur Andersen. These are virtual groups of consultants who share an interest in a specific industry, business process or competency, with a knowledge manager as facilitator and contact for any information needs that are relevant to the competency centre.

The Arthur Andersen Knowledge Management Model is very relevant to this IATUL Conference, "The Challenge to be relevant in the 21st Century", as the sub-themes of the four days link up with the four enablers in the knowledge management model.

> **Day 1:** Linking up with megatrends: to measure whether the leaders of the institution are aware of the changes that surround them and whether they are developing their plans for the future with them in mind, institutions can use the *leadership* measures in the KMAT.
>
> **Day 2:** Riding the technology wave: to measure how well institutions are riding the technology wave, they can use the *technology* measures in the KMAT.
>
> **Day 3:** Doing more with less: to measure how well institutions are reinventing themselves by collaborating and sharing knowledge, they can use the *culture* measures in the KMAT.
>
> **Day 4:** How to remain relevant and stay in business: to measure how well institutions are placing their efforts in the right context and checking their results against the expectations and real needs of their clients, they can use the *measurement* measures in the KMAT.

Finally, we can assess the advantages of using the KMAT by focusing on its cost, the time that will have to be spent on the study and the quality of the results.

Technological university libraries have limited resources available for measurement surveys and benchmarking studies.

> "Sorry, sir, our book has just been taken out" [3]

The KMAT is available free of charge from any of the 361 offices of Arthur Andersen in 76 countries. The processing costs $250-00.

Technological university library staff may not have time to design and distribute questionnaires, process the results and maintain benchmarking databases.

The KMAT questionnaires are ready to use. The questionnaire should take about an hour to complete. After submitting your completed KMAT to Arthur Andersen, you will receive a Benchmark Results Report depicting your scores compared with those of the benchmark group(s) you have selected. Your full colour report will be mailed to you within seven working days of our receiving your results [6].

The KMAT was developed jointly by Arthur Andersen and the American Productivity and Quality

Center. The database currently contains data from more than 140 companies, ensuring benchmarking of the highest quality.

I look forward to your participation in our study.

Acronyms

IATUL - International Association of Technological University Libraries

KMAT - Knowledge Management Assessment Tool

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Back to contents

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IATUL

GAELIC : CONSORTIAL STRATEGIES FOR SURVIVAL

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Background

GAELIC, the Gauteng and Environs Library Consortium, had its origins in a meeting of senior administrators, library directors, and IT representatives from seven tertiary institutions in Gauteng, with representatives of the Andrew W Mellon Foundation, on 3 February 1996. We were informed that the Mellon Foundation would be willing to fund the purchase of a common library software package for a consortium of libraries in the area, to facilitate and support resource sharing. The consortium was invited to submit a proposal to the Foundation.
FOTIM, the Foundation of Tertiary Institutions in the Northern Metropolis, had been established a few months earlier, and GAELIC was brought in under this academic umbrella body. Librarians generally saw this as a positive step towards greater understanding and support for their libraries by the senior administrations of FOTIM institutions.

The first meeting of the GAELIC Steering Committee took place on 15 April, 1996. By this time membership of the consortium had grown to eleven tertiary institutions located in this commercial and industrial heartland of South Africa. A management structure was established, several task groups were set up, and hard work began in a number of areas.

At this time membership consisted of the Medical University of Southern Africa, Potchefstroom University for Christian Higher Education, Rand Afrikaans University, Technikon Northern Gauteng, Technikon Pretoria, Technikon Southern Africa, Technikon Witwatersrand, University of Pretoria, University of South Africa, University of the Witwatersrand, and Vista University. Subsequently the University of the North West and the Vaal Triangle Technikon have joined GAELIC, bringing our membership to thirteen. It is possible that this number may increase in the future.

The Mission of GAELIC is to fully utilise and develop the information resources of the region for the purpose of promoting education, research and lifelong learning amongst its clients, as a contribution to development in South Africa.

Our Vision is to create a virtual library by linking together autonomous libraries via networks.

Our major Objectives are:

- to promote resource sharing and enhance access to information;
- to utilise appropriate and up-to-date technology and to keep abreast of new technological developments;
- to improve information literacy among clients and to share training resources and expertise where appropriate;
- to build links with other types of libraries in the region;
- to involve all interest groups through contact and collaboration; and

- to contribute towards the provision of information for the development of South Africa.

Having worked together in an informal way for many years but having also in the past been very conscious of institutional independence and autonomy, GAELIC members are now working together towards a culture of co-operation.

Common Library Software

The Mellon Foundation's emphasis on common software and resource sharing provided an immediate focus for the activities of GAELIC. Several libraries were either planning the purchase of a new library system, or becoming increasingly disenchanted with their existing systems. The University of South Africa (UNISA) had drawn up system specifications during 1994/1995, had visited sites and vendors locally and overseas, and had done a preliminary assessment. UNISA was agreeable to sharing this information and its shortlist of vendors with GAELIC, thereby saving the consortium a great deal of work.

During May and June 1996 these specifications were expanded to meet consortial requirements. A Request for Information (RFI) was sent to four overseas and two local software vendors. Responses were carefully assessed, and two vendors were invited to come to South Africa to demonstrate their systems. Library and IT staff from all member institutions were invited, and those who work with particular modules (for example circulation or cataloguing) were encouraged to attend relevant sessions. When the system decision was finally made, we were satisfied that the selection process had been thorough and democratic.

In August, INNOPAC, developed by Innovative Interfaces Inc. (III) was unanimously chosen as the common software package for GAELIC. Six libraries wished to implement as soon as possible - now known as Phase 1. Remaining members, for various reasons, decided to wait a year or so before changing to INNOPAC.

Our Proposal was submitted to the Mellon Foundation in October 1996. In November, price negotiations took place with III, and on 6 December, only 8 months from inception, GAELIC was awarded a generous grant by the Mellon Foundation for Phase 1 implementation. We were assured by the Foundation that a proposal for Phase 2 would be welcomed as soon as we were ready.

Two conditions required resolving before the Foundation would release the bulk of the grant. Firstly, it did not wish to pay 14% value added tax (VAT), but wanted the full value of the grant to benefit the libraries concerned. Secondly, very aware of the high cost of connectivity in South Africa, the Foundation requested that some resolution be sought with Telkom, the local monopolistic telecommunications company, regarding reduced network tariffs for tertiary education.

CALICO (the Cape Library Cooperative) had been awarded a similar grant under the same conditions, and it was agreed between the two consortia that CALICO would take the lead on the Telkom/connectivity issue, and GAELIC on the VAT exemption issue.

VAT Exemption

On the advice of a reputable firm of accountants, and with the assistance of an advocate on the staff of one of the member institutions, FOTIM's Constitution was amended to clarify its status as an "association not-for-gain" rather than a "trust", and GAELIC became a "committee" of FOTIM. The tax laws in South Africa rule that tax exemption may be granted on donated goods received by a not-for-gain association, but not on donated services. The accountants felt that a case could be made for exemption on the hardware, which would be classified as goods, but not on the software, which would be regarded as services. GAELIC put forward a strong argument that in the case of a library system, the goods were no use without the services, and vice versa. The two were inextricably linked. The Commissioner for Inland Revenue was persuaded that this was in fact so, and VAT exemption was granted on the total value of the donation. This information and copies of relevant documentation have been shared with other library consortia in South Africa that either already have or are hoping to receive funding from the Mellon Foundation.

Connectivity

Good connectivity is of course critical to the success of any hi-tech library system, and to regional and national resource sharing. All data links in South Africa are supplied by Telkom, a profit-making parastatal organisation, under government regulation. This monopoly will exist for at least another three years. Problems had been experienced frequently with Telkom's service, and the bandwidth was neither fast, reliable, nor affordable. All GAELIC sites are linked via UNINET, the academic network in South Africa, which is dependent on Telkom and which fought long and hard to have its backbone lines upgraded recently to 2 and 4Mb. Campus access to UNINET varies considerably within GAELIC, and several members need to upgrade their campus networks in order that successful resource sharing, electronic data transfer, and Internet access may take place.

Internet connectivity at tertiary institutions is generally via UNINET, is thus Telkom-based, and the cost is high. Unlike the situation in many overseas countries, Telkom doesn't offer any educational discounts, and several institutions are either limiting or charging for Internet usage by students and staff in order to contain costs. Some GAELIC sites have opted to use commercial Internet service providers for their overseas links. Telkom was recently involved in a bid to control Internet traffic, and the matter is currently being addressed in the courts.

Talks between Telkom, CALICO and GAELIC began last year, and are ongoing. From these has emerged the Virtual Library Project, a visionary proposal which, if accepted and funded by Government, will make information and the Internet accessible to schools and community libraries throughout South Africa. It is expected that tertiary libraries would have a major role to play, as they hold the majority of the country's information. However, it remains to be seen what immediate benefits will be forthcoming for tertiary education in the form of reduced bandwidth costs.

Fortunately the Mellon Foundation is not holding up grants pending a satisfactory conclusion to all this. It is aware of the effort that is going into negotiations with Telkom and the Government, and in fact has taken the lead in the United States in bringing together a number of large foundations interested in seeking solutions to the connectivity problem affecting tertiary education in South Africa.

Back at grass roots level, GAELIC's system implementation consists of separate local INNOPAC installations at each of the six sites, which will link via UNINET to an INNOPAC union database. Careful consideration was given to the system architecture. Although more expensive, a distributed system was chosen in order to lower the amount of network traffic on UNINET and our dependence on Telkom, and also to cater for institutional autonomy and differences - always a sensitive issue. We didn't want our smaller partners to feel dominated in any way by the larger institutions when it came to setting parameters for the system. III agreed to accommodate this architecture within the budget available, and the decision has already paid dividends in that matters which might have taken long hours of negotiation between member institutions have been settled locally.

Implementation of Phase 1

Recognising how difficult is for the educational sector to hire and retain good technical expertise, GAELIC contracted SABINET Online to host the GAELIC union database, to undertake data conversion from SAMARC to USMARC, and to provide us with a project management service. In addition, a System Implementation Management Committee has worked extremely hard, taking responsibility for issues such as data conversion and clean-up, implementation schedules, training programs, and installation and implementation of the system at each site. The situation was made more difficult in that some of the Phase 1 institutions had been left ?high and dry? by local vendors, existing systems were no longer being maintained, and such vendors were of little help with complex data conversion problems. However, hard work on the part of the Implementation Committee and good advice from experts at III paid off, and we are satisfied that the bibliographic data of GAELIC Phase 1 is of a high and internationally acceptable standard.

Phase 2

A Proposal for funding for Phase 2 was submitted recently to the Andrew Mellon Foundation. We shall be advised of the outcome on 8 June 1998. GAELIC is meanwhile moving ahead with implementation plans for the six Phase 2 libraries.

Resource Sharing

Resource sharing is the responsibility of our largest task group, which operates via four sub-task groups: Joint Acquisitions, Human Resources, Document Supply and Serials.

The Joint Acquisitions team is investigating electronic media as the most viable option for joint collection development and resource sharing. Donor funding has been obtained for the purchase of a year's subscription to two full-text web-based databases, which are currently being used and evaluated by GAELIC members. We aim ultimately to optimise the spending power of GAELIC members through negotiating competitive consortium pricing.

The Human Resources group is providing regional support and training for GAELIC members, particularly in the area of IT, but also in areas such as negotiation skills, management of change and labour law.

Document Supply has existed among libraries for decades. To improve document delivery within GAELIC, Ariel software has been installed at all member institutions, and we hope shortly to achieve a 2 working day turnaround time. Funding will be sought to install additional Ariel workstations in branch libraries on campuses, to further improve response times.

The Serials Workgroup is, predictably, looking at the rationalisation of resources, joint purchases of expensive material, and collection development in the Gauteng region and ultimately nationally.

Resource Sharing is core to the mission and objectives of GAELIC, and the work of these teams is very important. Skilled staff from relevant departments in all our libraries meet regularly, combining their knowledge and experience, getting to know their colleagues, and contributing to the progress of GAELIC.

Cataloguing Task Group

This group works to ensure a high bibliographic standard of all records, not only on each member library's local catalogue, but on the GAELIC union database too. Workflow in technical processing departments, staff training, shared cataloguing, and copy cataloguing from databases such as OCLC's PromptCat are being investigated and promoted.

Formal Agreements

A year after inception, we had to stop and take stock of where we were at in GAELIC, what our expectations were, and what we could expect of our partners. Six Phase 1 libraries were vigorously moving ahead with system implementation, and GAELIC was embarking on a number of joint projects requiring financial contribution from participating members. Mutual reliance was becoming important, and written agreement was needed to identify exactly what was being committed to. The formulation of business plans for all GAELIC projects had become necessary.

In addition to customary contracts and agreements, a Common System Agreement has been signed by members using the INNOPAC software and related hardware, and deals with the relationship between GAELIC and these libraries regarding the system software, performance levels, training, hardware, financial obligations and ownership. An Addendum to GAELIC's original Memorandum of Agreement sets out the rights and duties of members, the management structure of GAELIC and the powers and composition of its various committees.
Much work has gone into setting up these formal structures which we hope will enable GAELIC to

operate smoothly and without misunderstanding as we become more diverse and complex. They are vitally important as we move into the areas of joint acquisition, journal rationalisation, and contribution to the GAELIC union database.

Strategic Partnerships

From inception, GAELIC resolved to make use of existing infrastructures in South Africa, rather than duplicating effort. To this end we are using UNINET to link our member libraries, and are working closely with SABINET Online regarding services such as project management and the union database. We hope that the GAELIC union database will form the basis of a new, high quality South African national union catalogue. The Director of the State Library has been an observer on our Steering Committee since inception, and members of his staff participate in the work of the task groups. The CSIR (Council for Scientific and Industrial Research) has initiated discussion with GAELIC regarding the possibility of a strategic partnership.

We are in close contact with other consortia in South Africa, and have worked particularly closely with FRELICO, the Free State Library Consortium. Its two major tertiary members, the University of the Free State and the Technikon Free State, are purchasing INNOPAC software, will become nodes of GAELIC, and will contribute to the union database. GAELIC supports the national consideration of certain issues rather than regional as we feel that our country is too small to accommodate the duplication of major resources and initiatives.

Benefits of belonging to GAELIC

Membership of a consortium such as GAELIC provides an opportunity for the sharing of scarce resources - financial, human and material. In fact it is believed to be the only way libraries can manage the economic hardships that have become part of our lives. We are not looking at choices here, but at survival.

GAELIC has been hard work for all involved. However, the benefits are many, they justify our existence, and encourage our commitment. We feel we have a better chance of attracting donor money as a consortium than as thirteen individual institutions. Immediate access to the combined resources of GAELIC will benefit teaching and research in the region. Sharing staff expertise, development and training with our neighbours will go some way towards redressing imbalances that currently exist. A further very positive benefit of GAELIC is the enthusiastic communication happening amongst staff at many levels in libraries - staff who in the past rarely had the opportunity to meet their colleagues in other university and technikon libraries.

Conclusion

GAELIC is a wonderful resource, holding at least 40% of the information available in libraries in South Africa. How can we best utilise it? By enabling a user to search firstly the local online catalogue (or OPAC) at his or her institution, then, at the touch of a key, to search the online database of the GAELIC union catalogue of over five million titles, seven million volumes, and 20 000 current periodical titles, and be informed of the circulation status of the item he or she is looking for.

However GAELIC is more than an information source, more than a group of cooperating libraries. It is a pooling of the resources and energies of participants into an exciting new entity – our regional virtual library. We face many challenges, and no doubt many problems too. We have learned that one can never be too democratic. We have learned how important it is to achieve consensus, to give every member an opportunity to voice opinions, to be sensitive to those of our members who were disadvantaged in the past, and to keep the momentum and drive going. But we are an enthusiastic and committed team, and we feel certain that we have a better chance of survival in GAELIC than out of it!

Acronyms and abbreviations

FOTIM	Foundation of Tertiary Institutions in the Northern Metropolis
FRELICO	Free State Libraries and Information Consortium
GAELIC	Gauteng and Environs Library Consortium
IT	Information technology
III	Innovative Interfaces Inc.
Mb	Megabit
OCLC	Online Computer Library Center
OPAC	Online public access catalogue
RFI	Request for information
SABINET	South African Bibliographic and Information Network
SAMARC	South African machine readable cataloguing
UNISA	University of South Africa
USMARC	United States machine readable cataloguing
VAT	Value added tax

Back to contents

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AVOIDING THE REEFS AND RIPS WHILE RIDING A RELEVANT TECHNOLOGY WAVE INTO RURAL REGIONS

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Overview

Apologies, Chair for inflicting this alliterative title on you to read out, but it's probably easier than the old tongue twister about the ragged rascals running round rugged rocks on which it was based. Apologies too from my co-presenter, Vicki Williamson, our University Librarian, who was unable to make the conference due to work commitments.

What I'll be covering in this session is:

- A number of imperatives that are driving Curtin University's Library and Information Service to reticulate our scholarly electronic information services to our clients wherever they are;
- What services we are offering our clients;
- What barriers our clients and ourselves face; and
- Strategies and solutions that are being put in place to overcome these barriers.

This paper draws on evidence that shows a low uptake of data communications usage in regional Western Australia and we urge caution in getting carried away at this stage about offering "virtual" library services, particularly in developing countries.

I'll conclude with some remarks on an appropriate approach to technology/information transfer from so called developed countries to developing countries.

The Imperatives

Let's have a look at what's driving Curtin's Library and Information Service (Curtin LIS) to offer more and more services digitally.
Like most other Australian universities we are experiencing strong annual growth in the number of students studying in the distance education mode. Many of these, however are not truly "distant", but live within the metropolitan area, thus linking in with the client focused trend to provide open and flexible learning opportunities. Nevertheless there are significant numbers of our clients scattered across rural and remote areas that have to be served by the Curtin LIS. We also have remote service delivery sites at regional campuses hundreds of kilometres from Perth. (These are in Northam 90 km from Perth, Kalgoorlie, 600kms distant and at Esperance, the most remote, at 900 kms away). To serve these sites adequately with on-line information and to keep our library systems running in realtime over such distances requires adequate bandwidth and reliability. Looking further afield there has also been steady growth in the number of students studying offshore - a growth fuelled by the Asian currency crisis as it is cheaper for these students to study from their home countries than come to Perth. Our university,

through its current strategic plan, has also emphasised the need for more resource based, independent learning, which carries a significant potential impact for library and information services.

The Offerings

As part of the University's World Wide Web home page, our Office of Educational Advancement maintains Curtin Learning Link, aimed at distance education students. These pages offer links to LISWeb, the Curtin LIS presence on the Web. We use LISWeb for two main purposes - promotion and as a platform to access our digital offerings. In line with the LIS strategic plan, that states that we will prefer electronic formats to print, the portion of money spent on these resources has grown to 15% of our acquisitions budget. This has resulted in more than 200 databases, with as many as possible linking to full text material, being on offer. The university is also emphasising the need to offer more and more courses on-line and when this takes off we trust that use of LIS electronic scholarly information will also rise dramatically.

Initiatives launched by the Western Australian Group of University Librarians will also require world class telecommunications infrastructure to function properly. A good example is client initiated interlibrary loans, with its concomitant benefit of broadcast searching of catalogues at various local university libraries.

The Barriers

I'll deal with these in two broad categories - demographics and communications.

Demographics

Western Australian (WA) is a vast, sparsely populated area. At 2.5 million square kilometres it covers roughly a third of Australia, and is equivalent in size to South Africa, Namibia and Botswana. Yet it is sparsely populated with only about 500 000 people (2.6% of Australia's population) living outside the Perth metropolitan area. The cost implications of providing adequate infrastructure across an area with these characteristics are frightening.

Western Australia justifiably lays claim to adequate infrastructure as it is a most productive part of Australia, providing some 25% of national exports, with 87% of these coming from the non-metro area, largely from the agricultural and mining sectors.

Some of the more remote farms rely on local generators for power and these don't run all day which can play havoc if one needs to use a modem, for example. Rural power generally is not as reliable as in the metro area.

Communications

WA has near total coverage for standard telephones, although the practice of timed calls in the regional areas acts as a deterrent to Internet use. Mobile phone (or cell phones as you call them here) coverage is much less widespread, probably around 7.5% and there is a lot of pressure being exerted for the extension of this service. Further deregulation of the telephone market leads to providers taking a hard financial look at the viability of expanding coverage, but experience has shown that once the service is available there is a dramatic take up rate.

If we look at communications for data transfer a number of inhibiting factors emerge. The roll out of high capacity and high speed fibre optics occurs from the eastern seaboard of Australia and availability gradually reduces as one moves from the metro, through the regional, rural and remote areas. Fax and data communications are also hampered by some outdated telephone exchanges that have not yet been upgraded to digital. In addition to the timed calls issue mentioned earlier, Internet use is also inhibited by most Information Service Providers (ISPs) being located in major regional centres, with users incurring distance charges to access them. The ISPs costs are also higher as they have to cover leased line costs, usually to Perth.

Service support and expertise in terms of sales, technical, hardware, software, sales and training also peters out the further one moves from the metro area.

Let's take a look now at some sobering statistics taken from the communications audit [1] mentioned in the overview. This audit, conducted by a consulting group for the WA state government presents a clear picture of telecommunication services in WA. Methodologically sound and detailed, it is based upon a series of local consultations, surveys and interviews with, amongst others, residents, chambers of commerce and businesses. We will only look at a few key findings, reported in May 1997.
In the metro area 21.2% of homes had a fax and 43.4% a computer. 9.1% used modems, 2.0% had a modem and did not use it, while 19.2% intended buying one. In regional homes 17.2% had a fax and 35.6% a computer. 4.5% used modems, 3.9% had a modem and did not use it, while 14.1% intended buying one.

The extremely low use of home modems reported by regional areas is a concern for us and it may indicate that our virtual library offerings can only reach an extremely small portion of the population. (It could be argued that students may make up a large percentage of the 4.5% who do use modems but this has still to be proven.) Some of the major reasons given by those who had computers but not modems also make interesting reading. 60% said they had no need or interest, 16% cited equipment cost, 5% communication cost and 4.5% had "just not got around to it".

Survey results of the business community showed similar disparities between data usage as for home users. In the metro area 79.5% of businesses had a fax, 76% a computer and 17.6% used the Internet for business. In the regional areas 81.1% of businesses had a fax, 59.2% a computer and 7.2% used the Internet for business.

There is a considerable difference between the metro and the regional businesses in terms of Internet usage. Traditional wisdom would argue that the Internet is a mechanism that should effectively reduce the tyranny of distance in these areas, but clearly the barriers mentioned earlier mitigate against uptake of these technologies.

The Strategies

State Government

There is considerable State Government interest in improving rural communications in Western Australia. A major driver is the Deputy Premier of Western Australia, who is also the leader of the predominantly country based National Party. He has established an Information Policy Council (chaired by a prominent Curtin University academic). Appointments are also being made to the newly established Office of Information and Communications. Products of these initiatives to date include the communications audit, a strategic plan covering rural communications [2] and a successful conference "Beyond the Big City - Bridging the Communications Gap" that included participants from across WA using interactive videoconferencing from telecentres.

Universal Service

A further strategy being pursued is to reform the Universal Service Obligation. The principle underlying Universal Service is that all Australians, wherever they live or work, should have reasonable access to a standard telephone service. Interestingly, the Australian Communications Authority has just announced the establishment of a public enquiry to look at the costs benefits and risks to include digital capability as part of the Universal Service Agreement. The review will be completed by mid August 1998. The WA Rural Communications Strategy pre-empted universal service reform in April 1997, calling for a WA minimum Universal Service basket including a world-class telephone service and a digital service of at least 64kb/s.

Capability of this magnitude would obviously go a long way to alleviating current difficulties with digital data transfer.

Educational Television

Educational television is provided through:

- ABC/SBS, which are mainstream broadcast television stations.
- Ed-TV which broadcasts about 10 hours of educational TV through a regional network, sourced from some sectors of the WA higher education sector, including Curtin University.
- Channel 31, the last free-to-air TV channel, that is just becoming available for non-standard use, such as horse racing and education. Once again Curtin intends to play a major role as a shareholder and content provider.
- Westlink, a satellite-based narrowcast interactive TV service that can be received in telecentres and other receiving facilities. Curtin LIS has one of these at our remote service site in Kalgoorlie.

Telecentres and MITEs

Currently there are about 70 telecentres in WA providing satellite receiving terminals, televisions, loudspeaker phones, fax machines, personal computers, modems and general office equipment. Plans are afoot to expand telecentres in WA to 100, funded from the A$ 250 million Federal Government Regional Telecommunications Infrastructure Fund, "Networking the Nation".

This scheme aims to assist economic and social development of regional Australia by funding projects that enhance infrastructure, increase access and promote the use of networked services and reduce disparities with urban areas.

The latest development is in the production of MITEs - Modular Interactive Telecommunications Environments. These include much the same equipment as in telecentres, but in a standardised hardware and software environment. They cost about A$200 000 each, which includes the building and equipment. A WA initiative, plans are afoot to export MITEs to Asia - so much for Australia's strict qurantine regulations!

The above developments are most encouraging and we hope that continued public sector and local community support will see telecentres and MITEs, preferably linked to local libraries, continue to flourish.

Information/Technology Transfer

Before concluding, I would like to spend a few minutes on this important topic. Obviously there are many attractive options available to librarians for taking our virtual libraries to our communities. However, transferring these technologies holus bolus to developing communities is fraught with dangers and difficulties and many grand schemes have failed. Some common sense precautions are the following:

- Understand the environment in which the technology will be introduced
- Determine local needs, priorities - remember the local may have far more pressing priorities than electronic scholarly information
- Look for similar successful applications and follow this pattern rather than attempt to re-invent the wheel
- Determine the local capacity to use the technologies - both in terms of expertise and infrastructure
- Put in place mechanisms that will ensure the investment in technology is maintained - and monitor progress.

Conclusion

We have tried, with this presentation, to point out that even in a highly developed, wealthy country such as Australia many obstacles still have to be removed before the fruits of the digital era can be reaped by all. However, there is hope that as we enter the next millennium the benefits of the information age can be more equitably distributed for all. Let's not get too carried away with much of the hype until then.

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Back to contents

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FACTORS RELATED TO FACULTY PUBLISHING PRODUCTIVITY

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Introduction

"If the core activity of the scholarly and academic professions is the advancement of knowledge, the criterion for determining who does and who does not belong to these professions is professional publications, or sometimes scholarly reputation." Although Light goes on to allow that several other criteria could also be used, he returns to publication as the primary measure of professionalism within academe. If publication is the sine qua non of membership in the scholarly community, administrators and others responsible for managing a university's resources should be intensely interested in gaining a better understanding of the factors that support faculty in their efforts to perform and publish research.

Research into scholarly publishing productivity has moved beyond analyzing solely the correlation that directly measured variables such as institutional size, previous publication, and personal demographic and career related factors, such as age and rank, have on the number of articles published to include analysis of the role played by psychological and other latent variables in faculty productivity.[2] Fox conducted a literature review of the early work on variables that influence publication productivity among scientists in which she categorized the factors into three major groups: individual-level characteristics (including psychological traits), environmental location (including institutional prestige of both one's employer and one's graduate degree), and feedback processes (such as peer recognition or citation). Fox's conclusion was that: "While certain variables from each perspective do correlate strongly with productivity no one study or perspective explains the vast variation in...productivity, and the challenge for productivity studies lies in the capacity to combine perspective and untangle effects."[3]

Combining perspective and untangling effects, however, is not an easy task. It requires the use of highly sophisticated data analysis techniques as well as a well-developed survey instrument. This article reports the results of a study that used Confirmatory Factor Analysis techniques to analyze data collected using the *Faculty at Work* survey instrument in an effort to "untangle effects" and confirm the factor composition of theoretical constructs used as the basis for this questionnaire. The study also presents results of the construction of a new section of the questionnaire concerning the "campus information environment" and identification of the factors that may comprise

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that theoretical variable.

Theoretical Model

Robert Blackburn and his colleagues conducted the first *Faculty at Work* survey in 1988. It "was designed to gather data on faculty perceptions of their work environment, their own competency and efficacy as faculty members, their assumptions about teaching, and their research, teaching, and service behaviors."[3] Survey items were based upon theoretical constructs from the higher education research literature related to important personal and environmental properties as well as upon extensive interviews conducted with faculty on campuses representing a diverse set of environments. Four thousand four hundred faculty members responded from a multi-disciplinary sample that was drawn to reflect the national distribution of faculty by Carnegie Institutional Classification type.

In developing the instrument for *Faculty at Work*, Blackburn and his colleagues have built a theoretical framework within which to posit groups of variables. Need theory, life-stage theory, socialization theory, and reinforcement theory were used to describe possible relationships among correlates. The various pieces of the model were linked together within a cognitive motivation framework that proposes that "the manner in which people differentially assess their personal abilities and interests interacts with their perceptions of the organization's priorities (what it supports) and causes them to engage extensively in some activities and less frequently in other activities"[4] (INSERT FIGURE 1)

The theoretical model upon which this study is based, represented in Figure 1, is a modified version of the model used by Blackburn and Lawrence. The theoretical bases for the structural relationships among the constructs draw heavily upon cognitive motivation theories and social cognition theories. Underlying premises for this framework include:

> "First, academic institutions are achievement laden environments in which the evaluation of faculty, student and administrator performance is ongoing. Second, faculty use assessments of themselves and their social contexts to make logical decisions about their actions. However, not all decisions require the same level of detailed situation analysis. Third, experience over time leads individuals to modify their understanding of their work environments as well as their self-images. These changes can affect the subjective incentive value of different facets of work and, consequently a faculty member's level of engagement in different activities can shift. Fourth, some types of self-referent thought and perceptions of the work environment are more enduring than others that change frequently on the basis of personal feedback and vicarious experience."[5]

Socio-Demographic variables are the exogenous personal variables, including gender, race, and chronological age. These variables are first in the model because of their ability to influence an individual's access to career opportunities and the development of personal values and goals.[6] Professional Career variables include: the graduate school from which one received a Ph.D. (with its attendant socialization process concerning the respective values of research and teaching), one's discipline, prior publication record, career age, current rank, tenure status, type of employing institution and one's administrative position within that university. Empirical evidence supports the notion that "accumulated advantage," or the "Matthew effect,"[7] i.e. the tendency for people who have early recognition to receive increasingly more resources and opportunities for further recognition and publication, can mediate many other effects, especially those of chronological age.[8] Other career variables have equally significant effects on publishing output that, in general, overshadow the effects of socio-demographic variables.[9]

Self-Knowledge represents self-evaluations in terms of beliefs about personal and professional self-image, self-efficacy and competence. Cognitive motivation research suggests that "individuals' understanding of themselves (e.g., their self-assessed competence, personality dispositions, efficacy, etc.) predict how they perceive their environments (e.g. norms, resources, etc.) more frequently than environmental perceptions predict this self understanding."[10] The importance of self-efficacy in scholarly productivity, especially for women researchers, has been confirmed in a recent study by Brown et al.[11]

The exogenous environmental variables are denoted by the Environmental Conditions construct which represents the institution itself, its financial base, location, student body, and governance structure. Environmental Responses include reward systems, performance evaluations and (dis)incentives that faculty receive for certain behaviors.

The key construct in this model is Social Knowledge. This set of variables is a focal concept that represents the interaction of perceptions of the environment and perceptions of self that constitute the motivational basis for faculty behaviors. Blackburn and Lawrence's premise is that reinforcement, socialization, and social learning theories all support the theoretical assumption that the environment shapes an individual's perceptions of desired behavior both directly through statements of institutional goals, faculty role expectations, etc., and indirectly through rewards and other feedback on performance. Furthermore, expectancy theories, efficacy theories, information processing theories and attribution theories also lead to the proposition that individual behavior is the result of a complex interaction between personal and work environment variables.

Behaviors are mediated by Social Contingencies. This construct is comprised of events and crises that happen within the personal environment of the individual faculty member, such as birth of a child or illness of a spouse, that affect behavior and the quality of performance/outcomes. Behaviors may have many outcomes. The outcome of primary interest in this study is scholarly publishing output, especially the publication of scholarly journal articles or books.

In this study two significant modifications to the *Faculty at Work* questionnaire as administered by Blackburn and Lawrence were made. Researchers in higher education have not yet studied the impact that variables related to events in the personal life of faculty might have on scholarly productivity although their theoretical model includes such a construct. Life events, or "social contingencies," such as domestic strife or death of a family member have been proposed by Blackburn and Lawrence[12] but no empirical evidence of the role that these variables play has been gathered. Nor has any analysis been made of the factors that may comprise this latent variable. This study provided initial findings about the factor structure of the theoretical variable "Social Contingencies" and its impact on publishing output.

Educational researchers have also tended to overlook variables in the work environment related to the campus information environment that might have relevance to scholarly publishing productivity. Although variables related to size of library or journals subscribed to have been noted in a few studies[13] there has been no systematic investigation in the literature of higher education or library and information science of factors related to information use that may affect scholarly productivity.

The impact that information technology (IT) might have upon scholarly publication rates has received attention in recent years as more universities acquire the installation base required to assess this in a meaningful way. Early investigations by Almquist[14] indicated that the scientists he studied used information technology in the subject identification and proposal development stages of research and to acquire familiarity with literature outside their own specialties. Others[15] note that the relationship of information technology is still largely unknown. Massy and Zemsky state that "so far, most IT-based academic productivity improvements have involved doing more with more."[16] To the extent that the research process may be subject to economies of scale, they assert that the widespread introduction of IT should provide heightened productivity.

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Little research on the how the "campus information environment" contributes to faculty research productivity has been undertaken. The "campus information environment" refers in this study to all the major information resources available to faculty and the mix of telecommunications, equipment, and other information services that are supported primarily by expenditures through institutional budgets. This study that is one of the first to explore what are the factors that might comprise the campus information environment.[17]

In order to identify variables that might comprise the campus information environment the literature of library and information studies was extensively reviewed. Four basic components of a faculty member's information environment were identified to serve as theoretical variables comprising the campus informaton environment: personal information stores (such as personal book and journal collections); library information stores and services, including the assistance of a librarian; information technology and networking, including use of email; and the faculty member's assessment of the ease of use, personal enjoyment, and utility of information technology in his or her work. Several questions were developed, based on a review of the literature, for each of the four theoretical variables. The results were analyzed as to the strength of the factor structure of each variable and as to the variable's relationship to publishing productivity.

Data Collection and Analysis

This study was designed in part to test the structure of factors upon which the theoretical model underlying the *Faculty at Work* questionnaire is based. The faculty as a whole were considered to represent the population represented in Blackburn and Lawrence's fully generalized model for faculty productivity. The latent variables in question have been identified over time by these researchers through analysis of large, stratified sample data sets and the theoretical model represents a fully generalized model for all types of institutions and all types of faculty. This model posits no difference in the particular variables or the relationship among them, although different parameter estimates for effects within a causal, or structural, model analysis might be expected for different sub-populations. Since analysis of theoretical variables was the focus of this study rather than comparison of parameter estimates data were analyzed without subdividing respondents by gender, discipline or other criteria.

However, as a precautionary measure characteristics of the respondent pool in the main study were analyzed to assess their match to the institutional profile for faculty as a whole. Results of this comparison are displayed in

Table 1. Respondents displayed demographic characteristics highly comparable to the faculty as a whole based on information generated from a list of university mailing labels.

Questionnaires were keyed to allow the investigator to track non-respondents for a second round of distribution. The second round was distributed approximately six weeks after the first round. Total returned were n=845, or 34.2%. One explanation of the somewhat low return rate might be that the use of numbered questionnaires discouraged participation because

of the fear of identification of the respondent. The use of keyed questionnaires has been criticized, especially when the questionnaire includes potentially sensitive questions, such as those related to attitudes towards colleagues and department chairs.

To test the assumption that keyed questionnaires discourage returns, the investigator numbered 50% of the questionnaires and left 50% unnumbered during the second distribution to those who had not responded to the first round. Using the mailing label list, every second address was selected to be keyed with an identifying number to maximum the random nature of numbering. If it were true that numbering discourages participation, it could be assumed that a larger percentage of unnumbered than numbered questionnaires would be returned in the second round.

Returns did not support this assumption. Of the 1858 surveys

TABLE 1. COMPARISON OF POPULATION AND RESPONDENT CHARACTERISTICS

		Population	Survey	
1.	Gender			(n=839)
	Male	74.2%	74%	
	Female	25.8%	26%	
2.	Rank			(n=849)
	Professor	41.0%	50.1%	
	Assoc. Prof.	23.8%	22.6%	
	Asst. Prof.	18.8%	20.9%	
	Other	16.4%	6.4%	
3.	Discipline			(n=830)
	Science/ Applied Sci.	55.2%	52.2%	
	Social Sci.	32.9%	36.6%	
	Humanities/ Fine Arts	11.9%	9.0%	

distributed in the second round, one hundred nineteen numbered surveys and one hundred one unnumbered surveys were returned (Chi-square(1,1858) = 1.1706, n.s.). It does not seem as if the numbering of the surveys lowered the return rate.

Table 2. contains additional information about respondents, especially in regards to some of the characteristics of their information environment. One result of the data that was surprising is the number of respondents who replied that they had begun a "substantially new line of research investigation in the past two years." It may be that the campus information environment plays a particularly crucial role for researchers who change the focus of their research. This desires much greater study.

Part I of the *Faculty at Work* questionnaire, "Work Environment," has four sections. The first section (ENVIRONMENT A) contains general statements about the environment in which the respondent works, i.e. the institutional environment as a whole and the collegial environment in the faculty member's

TABLE 2. SELECTED PERSONAL DATA FROM MAIN STUDY RESPONDENTS

1.	The average number of years spent at this institution was 14.7, with a range from .5 - 40 years		(n=833)
2.	The year in whch the highest degree was awarded ranged from 1946-1993.		(n=708)
3.	The year in whch respondents were born ranged from 1920-1966.		(n=820)
4.	75.5% were tenured; 24.5% untenured.		(n=833)
5.	Native American Hispanic/Mexican American Asian African American Caucasian	0.6% 1.4% 2.3% 2.7% 92.8%	(n=823)
6.	55.2% had stared a substantially new line of research investigation in the past two years.		(n=842)
7.	94.8% had an office supplied for their sole use by the institution.		(n=848)
8.	74.9% had a computer supplied for their sole use by the institution.		(n=847)
9.	26.2% had sone level of administrative appointment ranging from 2% to 100%.		(n=840)

10. Use of software:

	Considerable	Not Supplied	
Spreadsheet	14.0 %	39.5 %	(n=826)
Word Processing	61.2 %	23.2 %	(n=832)
Statistical	17.4 %	40.2 %	(n=823)
Communications	21.0 %	36.5 %	(n=819)
Desktop Publish.	8.7 %	16.0 %	(n=266)

11. Estimates of the number of volumes held in personal collections both at home and in the office ranged from 0 to 8500, with a mean = 547. (n=801)

12. Estimates of the number of file drawers full of articles and photocopies ranged from 0 to 1000 with an median of 4 drawers. (n=831)

13. Estimates of personal journal subscriptions ranged from 0 to 44, with a mean = 5.7 subscriptions. (n=838)

14. Estimates of the percentage of personally held photocopies from items in the university's library ranged from 0% to 100% with a mean = 37%; median = 20%. (n=809)

15. Hours of student assistance per week ranged from 0 to 396* with a mean = 13.7; median = 0 hours weekly. (n=811)

own unit. The second section (ENVIRONMENT B) asks each respondent to first rate his/her satisfaction with his immediate administrator and then the next higher level administrator on a set of personal attributes related to effectiveness. The Campus Information Environment questions (INFORMATION ENVIRONMENT) were added to this section of the questionnaire since Blackburn and Lawrence's model proposes that information is part of the overall work environment.

Work Environment also concerns the perceived response of the environment in recognition of faculty accomplishments (ENVIRONMENTAL RESPONSE). The fourth section of this part of the questionnaire measures the perception of self-efficacy (SOCIAL KNOWLEDGE) of the respondent within the Work Environment, as she evaluates whether she can influence what happens to others and to herself.

Part II of the questionnaire consists of three sections. The first is a set of phrases describing attributes of a "valued" faculty member. The respondent rates a valued faculty member in their own unit and then rates him/herself on the same dimensions related to personal characteristics (SELF-KNOWLEDGE1 and SELF-KNOWLEDGE2). Section 2 consists of a list of circumstances outside of work (SOCIAL CONTINGENCIES) that affect one's ability to do research. Section 3 is a list of "Scholarly Activities" that have traditionally been assumed to be related to scholarly publication, such as making presentations about research, etc.

Attempts to identify factors comprising variables in the theoretical model used in *Faculty at Work* have previously been made using regression techniques. However, regression may be inadequate to satisfactorily analyze the role of latent variables when the factors comprising the theoretical variables have been identified initially only through principal components factor analysis. Principal components factor analysis relies on the occurrence of correlation among the data elements within the sample supplied for analysis. It can not account for measurement error and it can be subject to chance correlations or be totally confounded by the lack of strong correlations. Results may be unreliable and inhibit the development of variables that provide adequate discriminate validity to identify theoretical constructs.

Therefore Confirmatory Factor Analysis (CFA), using LISREL 7, was used in this study to verify the structure of latent variables which serve as the theoretical basis for the *Faculty at Work* model. CFA provides a means of further testing structure within the data, separating out measurement error from the relationships among measured variables and latent variables. Rather than capitalizing on chance correlation among variables, CFA uses analysis of variance/covariance matrices to analyze whether the data confirms the theoretical construct.

Evaluation of the "goodness-of-fit" of confirmatory factor analysis output is often made through the c^2 test, but a c^2 test is adversely affected by large sample sizes. Therefore, other diagnostics are also useful. In this study the Comparative Fit Index (CFI), proposed by Bentler[18] as a normed index, ranging between 0.0 and 1.0, based on the degrees of freedom in the hypothesized model and the null model was used as the primary Goodness-of-fit criterion. Generally, CFI values greater than .90 are considered to indicate adequately fitting models. Once a model achieves a CFI of .9 or better, modification should cease since any further improvement is likely to occur from capitalizing on chance relationships within the data.

Results for the confirmatory factor analysis of the study data are summarized in Table 3. These factors were then used in a structural equation

TABLE 3. CONFIRMATORY FACTOR ANALYSIS RESULTS

Factors Composing Theoretical Variables	CFA Results
I. Work Environment	

ENVIRONMENT A	
Rewards and Trust	CFI=.94
Faculty Committed to Teaching	
Collegial Support for Individual's Research	
ENVIRONMENT B	
Immediate supervisor	CFI=.97
Administrator two levels higher	
INFORMATION ENVIRONMENT	
Enjoyment/Use of Technology	CFI=.92
Access to Research Resources	
Computer/Software Support	
Personal Information Environment	
Telecommunications Environment	
Help from Librarians	
ENVIRONMENTAL RESPONSE	
Other Rewards	CFI=.91
Salary/Promotion	
SOCIAL KNOWLEDGE	
Departmental Affairs	CFI=.93
Research	

II. Personal Characteristics.

SELF-KNOWLEDGE1	
Interpersonal Skills	CFI=.88
Active Researcher	
Public Work Ethic	
Communicates/Organized	
Competitive/Ambitious	
Personal Work Ethic	
SELF-KNOWLEDGE2	
Interpersonal Skills	CFI=.82
Active Researcher	
Values Work over Homelife	
Works Hard/With Humor	
Personal Integrity	
Competitive/Ambitious	
SOCIAL CONTINGENCIES	
Child Care	CFI=.93
Other	

modeling process to test the statistical significance of the theoretical constructs on publishing productivity.

"INFORMATION ENVIRONMENT" is the section of the questionnaire developed solely by this investigator. Items in this section were based upon both research and "common wisdom" in the field of library and information studies concerning the use of information stores and channels, personal information gathering strategies, the role of technology in providing access to scholarly information, and the role of librarians in supporting the scholarly enterprise.

The latent variables that emerged for the campus information environment were: "Enjoyment/Use of the Computer and Software"; "Access to Research Resources"; "Computer/Software Support"; "Personal Information Environment"; "Telecommunications Environment"; and "Help from Librarians."

It is interesting to note that one question, i.e. "Access to specialized software or hardware provided by the university for my research meets my needs," loaded on two factors. As indicated by the data structure in this survey, the answers to this question were related to both "Access to Research Resources" and "Access to Basic Computers/Software." This may indicate that another important factor related to specialized information processing tools of some other sort "lurks" between factors related to the provision of basic computer/software and basic library support. Or it may indicate the perception that the role of library in offering access to electronic databases for research is a significant and growing part of the how faculty define "research resources." Both these interpretations should be explored in future versions of the questionnaire.

SOCIAL CONTINGENCIES was the final section of the main study analyzed. Analysis led to a two-factor model that identified "Child care" and "Pregnancy/New child" as loading on one unique factor with all other contingencies forming one "Other" factor. One particularly interesting outcome of this study is that the factor "Other" had a positive sign associated with it. It may be the case that social contingencies actually promote publication in some instances, perhaps through providing a rewarding work related outlet for personal stress. "Child care" however, is a negative factor.

Structural Equation Model

Factors based on the CFA segment of the study were added, one construct at a time, to a LISREL 7 structural equation modeling program to test whether the constructs fit the model. Six iterations of the model were run beginning with Social Knowledge constructs. In addition to the theoretical constructs certain directly measured variables that had proved statistically significant in a regression analysis portion of the study were also added. Seven directly measured items related to common academic activities from the questionnaire that proved statistically

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related to faculty publishing productivity were: Prior publication rate (PRIOR); Submission of a scholarly article (SUB); Presentation (PRESENT) of ongoing work on campus or at a professional meeting; Writing a research report (REPT); Current research activity (RSCH) which is the sum of the answers to two questions about how many journal editorial boards one serves one and for how many journals one reviews submissions; Number of articles reviewed in the past two years (REVIEW); Submission of a proposal for a monograph (MONO); and Career grants activity (GRANTS). Additionally, the environmental variables realted to the number of journal articles (FILE) in one's office and hours of student research assistance (STUD) available for the faculty member also proved to be significantly related to publication. These variables were also added to the structural equation.

The results for the model that includes campus information environment constructs and directly measured variables as well as some theoretical constructs is shown in Table 4.

The model produced in this iteration illuminates the role of the Information Environment in publishing productivity and identifies some interesting areas for further research. Overall, the information environment variables are mixed in their effect on other variables. And not all the information variables contribute positively to publishing.

Standardized parameter estimates for INF equal to or greater than ±0.02 were achieved in the fifth structural equation for:

INF1 (-0.02) - Enjoyment/Use of Technology;

INF2 (0.04) - Access to Research Resources;

INF3 (-0.06) - Computer/Software Support;

INF4 (-0.14) - Personal Information Environment;

INF5 (0.13) - Telecommunications Environment; and

INF6 (0.05) - Help from Librarians.

INF1, INF3, and INF4 have negative signs in the structural equation. INF1 (Enjoyment/Use of Technology) may indicate that people who enjoy computers and software are not necessarily those who have higher publication rates. Neither are those who seek personal computer/software support (INF3) or who are constantly active in acquiring large personal information stores (INF4) those who publish more than their colleagues. Caution must be used in making predictive inferences since the results were not statistically significant.

TABLE 4 LISREL SOLUTION FOR FIFTH STRUCTURAL EQUATION

Variable:	PRIOR	RSCH	SUB	PRES	REV
Dir. Eff.	0.17	0.32	0.68	0.12	-0.01
Std. Error	(0.11)	(0.10)	(0.10)	(0.06)	(0.02)
T-Value	1.54	**3.28**	**6.48**	1.90	-0.30
Std. Value	0.08	0.20	0.54	0.15	-0.02

	MONO	GRTS	FILES	STUD	REPT
Dir. Eff.	0.05	0.07	0.01	0.00	-0.21
Std. Error	(0.20)	(0.02)	(0.03)	(0.01)	(0.06)
T-Value	0.24	**3.47**	0.28	-0.38	**-3.54**
Std. Value	0.01	0.17	0.02	-0.02	-0.24

	SOC1	SOC2	RESP1	RESP2	CONT1
Dir. Eff.	-0.16	0.26	-0.01	-0.01	-1.07
Std. Error	(0.54)	(0.62)	(0.13)	(0.32)	(0.96)
T-Value	-0.29	0.41	-0.07	-0.04	-1.12
Std. Value	-0.03	0.04	0.00	0.00	-0.11

	CONT2	INF1	INF2	INF3	INF4
Dir. Eff.	0.28	-0.05	0.34	-0.33	-1.21
Std. Error	(0.73)	(0.12)	(0.75)	(0.46)	(2.00)
T-Value	0.39	-0.39	0.45	-0.72	-0.61
Std. Value	0.04	-0.02	0.04	-0.06	-0.14

	INF5	INF6
Dir. Eff.	0.88	0.28
Std. Error	(0.59)	(0.33)
T-Value	1.50	0.85
Std. Value	0.13	0.05

Error Variance for the Structural Equations = 17.49
(1.63)
10.74

Squared Multiple Correlation for Structural Equations = 0.59.

The data suggest that if university administrators are interested in stimulating publication active support of faculty who like to experiment with hardware and software is not all that is required. Expanding unmediated browsability of information resources or direct subsidization of personal information stores is not sufficient either.

What seems to be required is faculty support of a different sort. Basic investment in research resources and the telecommunications environment and support from information professionals seem to be positively linked faculty publishing productivity. These factors bear further investigation and refinement by other researchers. But if these initial findings are substantiated it might suggest that library budgets, the campus telecommunications infrastructure and expanded individualized support from information professionals would be candidates for priority investment by university administrators.

Each of these factors should be explored further by other researchers and the findings of this study should be confirmed on another data set. However, this study serves as a good beginning in the identification of the role of campus information environment variables in publishing productivity.

ENVA, ENVB, KNOW1 and KNOW2 were in turn added to the structural equation in place of INF. They were not added to the equation in addition to INF because adding more variables to the model resulted in a situation in which the sample size was smaller than the number of parameters being estimated.

Non-significant standardized estimates equal to or greater than 0.05 for direct effects on publishing were achieved for SOC1, SOC2, CONT2 and ENVB2 (this value has a negative sign) in the sixth structural equation shown in Table 5. These results substantiate Blackburn and Lawrence's work in developing Social Knowledge, Social Contingencies, and Work Environment constructs. However,
the results indicate that the subdimensions" of the constructs identified in this study may be first-order latent variables in their own right rather than

TABLE 5. LISREL SOLUTION FOR FINAL STRUCTURAL EQUATION

Variable:	PRIOR	RSCH	SUB	PRES	REV
Dir. Eff.	0.21	0.27	0.63	0.15	0.00
Std. Error	(0.09)	(0.09)	(0.07)	(0.05)	(0.02)
T-Value	**2.29**	**2.97**	**9.62**	**2.84**	0.08
Std. Value	0.10	0.17	0.51	0.18	0.00
	MONO	GRTS	FILES	STUD	REPT
Dir. Eff.	0.10	0.07	-0.01	0.00	-0.23
Std. Error	(0.15)	(0.02)	(0.02)	(0.01)	(0.01)
T-Value	0.67	**3.66**	-0.41	0.05	**-4.12**
Std. Value	0.03	0.17	-0.02	0.00	-0.26

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	SOC1	SOC2	RESP1	RESP2	CONT1
	-----	-----	-----	-----	-----
Dir. Eff.	-0.58	0.64	0.02	-0.07	-1.63
Std. Error	(0.38)	(0.54)	(0.13)	(0.26)	(0.75)
T-Value	-1.53	1.19	0.18	-0.27	**-2.17**
Std. Value	-0.12	0.10	0.01	-0.01	-0.17

	CONT2	ENVB1	ENVB2
	-----	-----	-----
Dir. Eff.	0.76	0.05	-0.25
Std. Error	(0.58)	(0.17)	(0.19)
T-Value	1.32	0.27	-1.31
Std. Value	0.12	0.01	-0.05

Error Variance for the Structural Equations = 17.86
(1.49)
11.98

Squared Multiple Correlation for Structural Equations = 0.58.

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components of a second-order latent variable. No results were obtained when SELF-KNOWLEDGE variables were added which was probably due to the lack of clearly formed factors as determined by the low Comparative Fix Index values obtained in the Confirmatory Factor Analysis process.

The values obtained in each of the structural equations in Tables 4 and 5 are parameter estimates, dis-attenuated by error. The size of the respondent pool and the good-fit of the measurement models for each latent variable suggest that the data are clean and coherent. Modifications to Blackburn and Lawrence's framework based on these results should be investigated for other research universities.

Conclusions

The data reported herein confirm and refine many of the latent variables identified by Blackburn and Lawrence which are used as the basis for their theoretical framework and the *Faculty at Work* questionnaire. To the extent that the factors discussed in their work map closely to those confirmed in this study, their conclusions about the role these factors play in faculty productivity are supported. The factor structure identified in this study may provide an even stronger basis for future analysis of the role these variables play in faculty publishing productivity.

The factor structures of "Social Contingencies" and the "Campus Information Environment" were newly identified in this study. The results obtained indicate that several social contingencies may have a positive effect of publishing productivity. The reasons for this should be investigated more thoroughly, but preliminary results indicate that publication, as it is linked to higher salaries, promotion or getting a new job, is a productive outlet for the pressures of life. "Child care," however, seems to require that "attention," which some have called the scarcest resource of the 1990's, be diverted away from work. It seems to be a contingency that truly inhibits productivity.

Further research on the role that campus information environment factors play in faculty publishing productivity should definitely be undertaken. The factors identified in this study seem to indicate that computing support, including software and electronic resources accessed through telecommunications, is comprised of discernible factors that can be linked to productivity in the workplace as well as factors such as support of librarians and access to more traditional types of specialized research resources.

The relationship of variables traditionally associated with publishing, such as submitting articles, serving on editorial boards, writing grants, and one's prior publication record was statistically established. The finding that report writing relates negatively (and significantly) to publication may suggest further research on publication as a cyclical activity, with natural lulls as work on grants requires that results be put into reports but does not yet allow for publication of those same results. It may be useful to begin a systematic exploration of the role of information environment variables in the support of these precursors to faculty publication. It may also be fruitful to study the role all of the factors identified in this study play in support of other valued faculty behaviors such as teaching and grantsmanship. Further study of the role that the information environment plays in supporting faculty who wish to substantively change their focus of research is definitely warranted.

The identification of variables related to faculty life and verification of the factor structure comprising these variables is essential in promoting work environments that foster creativity and productivity. A better understanding of the faculty workplace is highly desirable an age of wide-spread accountability for the expenditure of public dollars in higher education. It may be absolutely essential if higher education is to be able to assume a significant role in society's growing information economy. This study has served as an initial foray into the greater depth of analysis needed in this area.

This study is based on the author's Ph.D. dissertation, University of Michigan (1996). Permission to use the Faculty at Work survey is gratefully acknowledged as is the advice of all members of my committee, including especially Robert T. Blackburn. A version of the questionnaire is also included in: Blackburn, Robert T. and Lawrence, Janet H. Faculty at work. Baltimore, The Johns Hopkins University Press, 1995.

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Doing more for less

Mike Johnson
Director CHEST & NISS
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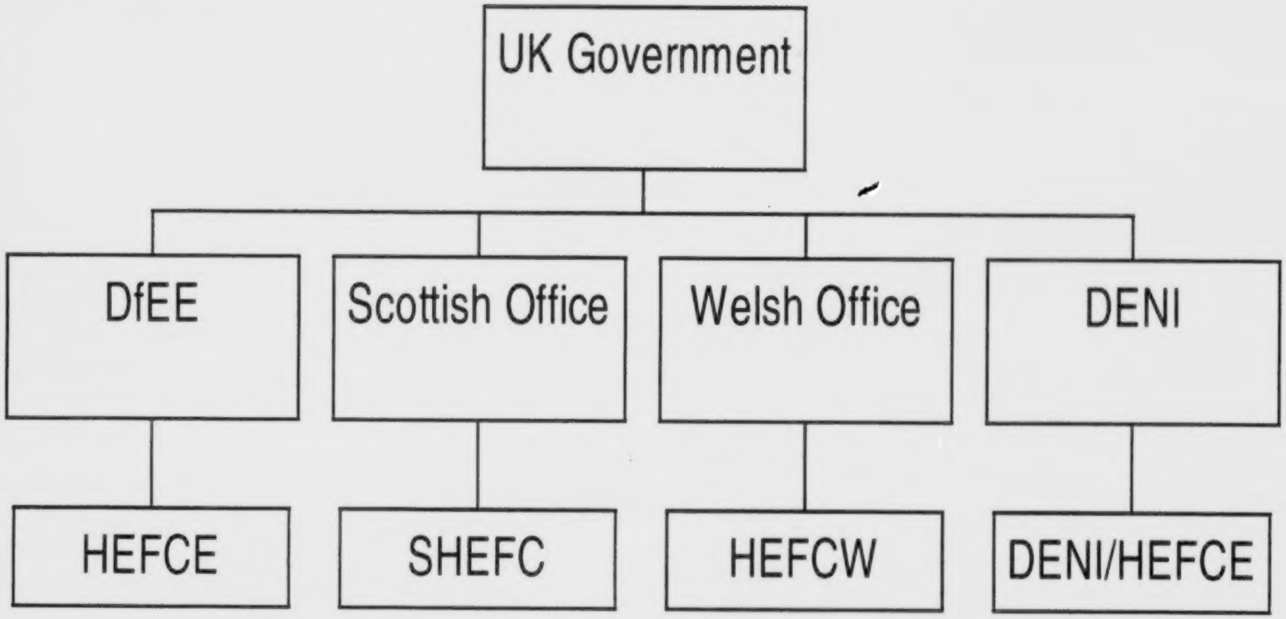
- CHEST
  - Products
  - Agreements
  - Selection Process
  - Pricing and Licencing
- Recommendations

Background - History

- CHEST & NISS set up by Computer Board (predecessor of the JISC) on 1 Jan 1988
- CHEST - negotiate for quality commercial software,data and training materials for the use by the UK education community
- NISS - provide information services to the UK education community

Background - UK higher education

UK HE



UK Government

DfEE

Scottish Office

Welsh Office

DENI

HEFCE

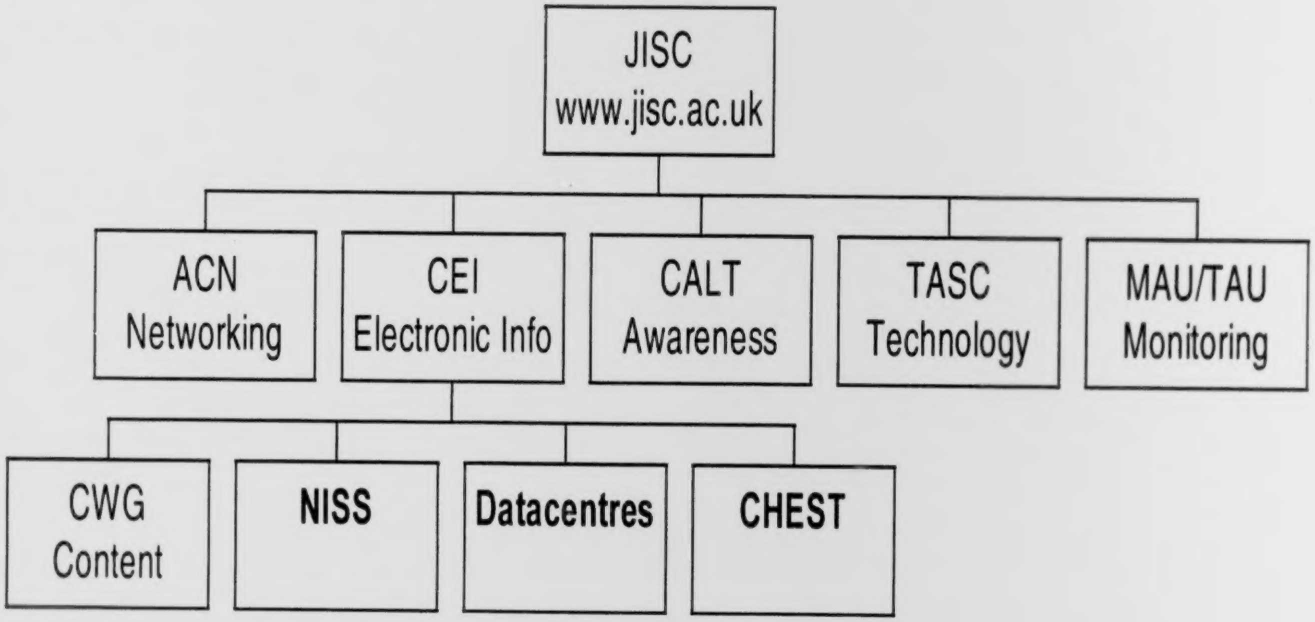
SHEFC

HEFCW

DENI/HEFCE

Background - JISC

JISC



JISC
www.jisc.ac.uk

ACN
Networking

CEI
Electronic Info

CALT
Awareness

TASC
Technology

MAU/TAU
Monitoring

CWG
Content

NISS

Datacentres

CHEST

CHEST & NISS

- Based at Universities of Bath & Southampton
- Part funded by JISC, part by earnings
- Approx 23 staff in total
  - (CHEST has 9 staff)
- NISS is part information service, part datacentre, part technology provider

Datacentres

- Created by JISC
- BIDS EDINA MIDAS (NISS)
- Resulted from 3 invitations to tender
- Specialisation expected to evolve
- Datacentres run data
  - – negotiated by CHEST
  - – negotiated by themselves
  - – negotiated by others

CHEST Products

- Agreements
  - – Software (55 agreements)
  - – Data (30 agreements)
  - – Courseware (5 agreements)
- Special Offers
- Directory entries (approx 1000)

Agreements

- Institution licences
  - – “free at the point of use”
  - – common licence conditions
  - – all non commercial use
- Most are 5 years
  - – fixed price
  - – committed till end of agreement
- CHEST collects fees, pays supplier
- CHEST manages & administers

Selection Process

- Product selected as a result of
  - comparative evaluation
  - feedback from the community
    - formal
    - informal
  - request from JISC (CWG)
  - offer from supplier

Pricing

- Price the institution pays comprises
  - cost of data
  - cost of service
  - cost of management
- less
  - any central subsidy by
    - datacentre funding
    - contribution to data cost

Pricing

- Take-up estimated on anticipated level of subscription
- Total cost / take-up / years of agreement = price to institutions
- JISC may underwrite
- Experimenting with move to tiered pricing
  - banding institutions by subject size
  - banding institutions by specific characteristics

Licencing

- All staff and students
- All non commercial use
- Licence based on CHEST Code of Conduct which most institutions incorporate into regulations
- Access control by Athens
  - single sign on, national usage
  - multiple databases and datacentres
  - control devolved to institution

Athens Access Management

- protects resources
  - on geographically distributed servers,
  - under the control of different organisations.
  - on external, commercially operated, internet services.
- distributed user management
  - authorisation properties are hierarchically inherited by default.
  - facilities for self registration and bulk loading.
- Single sign on.

Athens

- any type of resource from database down to individual documents and multimedia objects.
- Supports access using web, telnet and telnet based windows clients.
- Scaleable and resilient.
- More information:

http://www.athens.ac.uk

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More for less

- Win - win agreements
  - – good for users
  - – good for vendors
  - – more institutions at a lower price = more vendor revenue
- Collaboration
  - – shared support and training costs
  - – shared voice to vendor

More for less

- Critical mass
  - more institutions, lower service costs
  - add functionality
  - expand the user base
  - safety in the herd
- Competition
  - between databases
  - between service providers

More for less

- Consistency/conformity
  - standard license agreement
  - long term agreements
  - standard access methods
  - standard user interfaces

More for less

- Problems
  - “rogue” institution purchases
  - getting decisions from institutions
  - estimating the likely take up
  - getting the timing right
  - herding cats
  - dealing with low volume products
  - committees
  - money

More for less

- Is it worth it?
  - Cost reduction for institutions
  - subscriptions
  - service
  - negotiation
- Added value to community
  - £ 750 m ?
- Adds to sense of community

Advice for any consortium

- Enthusiasm and Dedication better than committees
  - pick your people well
  - give them room to manoeuvre
  - give them your support
  - don't let your organisation get in the way
- You can't do it on a part time basis
- You can't do deals to a timetable
- Agreeing the price is about 1% of the work

Further Info

- Current CHEST list at http://www.chest.ac.uk/datasets
- The CHEST brochure http://www.chest.ac.uk/about-chest/about-chest.html
- Code of Conduct http://www.chest.ac.uk/conduct.html
- General licence conditions http://www.chest.ac.uk/appendix-a-data.html
- mike@chest.ac.uk

Smarter higher education: information literacy adds value

Introduction

> *Information and knowledge are the thermonuclear competitive weapons of our time. Knowledge is more valuable and more powerful than natural resources, big factories, or fat bankrolls. In industry after industry, success comes to the companies that have the best information or wield it most effectively - not necessarily the companies with the most muscle (Stewart, 1997: ix).*

There is much talk these days of information societies, learning societies and the ability to use information critically. The rapidly advancing shift to knowledge economies in which resources created through ? *brain power* are increasingly more valuable in wealth creation than natural resources? and in which value is created with information, herald an era in which human resources are the most valued asset of the Global Information Society (Lepani, 1996: 4). It is in this context that the advancement of information literacy within a framework of lifelong learning is regarded as essential.

Information and knowledge are dynamic entities in constant states of flux and growth. According to Lenox and Walker, ? there is more information in a single edition of the new York Times than a man or woman in the sixteenth century had to process in the whole of his or her life? (1993: 312). The volume of information which people need to process is overwhelming often leading to information overload. Learners who have the competencies to learn for life therefore need the abilities to navigate a range of information systems, vehicles and highways and additionally require the skills to work with information critically. It is thus argued, albeit from a human capital perspective, that ? skills have become the key competitive weapon in the global market place? (HR Focus, 1992: 17)[1]. As Thurow writes:

> *The problem today is not just finding work for the functionally illiterate in a high-technology society. The problem also is how society itself can survive competitively if so much of its workforce cannot contribute effectively. Modern economies need a well-educated labour force, an educated elite does not suffice ... In an increasingly technological society, skilled, noncollege and blue-collar workers become more and more important ... Robots may build the cars of the future, but skilled human beings are going to maintain and repair those robots (quoted in HR Focus, 1992: 17).*

It is this condition in which there is much greater appreciation of the economic significance of knowledge and learning and the value of a skilled workforce and *smart workers* that focuses attention on learning cultures. The agenda for smart workers though, is precisely the kind of requirement of the Global Information Society (GIS) which is imposed on people with little regard for what they bring to development. From a somewhat different perspective, the South African Qualifications Association has emphasised a range of Critical Outcomes which are to be incorporated into all

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[1] It should be noted that in the context of this paper, skills should be seen to include knowledge and values (Babb & Skinner, 1997: 10).

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qualifications to ensure that the National Qualifications Framework it seeks to enact will create ? an integrated national framework for learning? that will improve quality of life and education (SAQA Bulletin, 1997: 5)[2].

This paper attempts to explore some of the difficulties encountered in integrating one of SAQA's critical outcomes, that of information literacy, into curricula in the hope of developing a framework of flexible learning. The lens through which the issues are seen is that of the INFOLIT experience. This paper explores the modest contribution made, both theoretically and in practice, by INFOLIT, an information literacy project of the Adamastor Trust[3] and CALICO, the Cape Library Cooperative, in the Western Cape Region. Lessons are drawn from INFOLIT to illustrate both good practice as well as difficulties in spreading information literacy education.

The context of globalisation, information infrastructures and knowledge systems

Globalisation, which includes economic, cultural and communications shifts presents a paradox of new forms of imperialism co-existing with the potential for the developing world to use the convergence of telecommunications, microelectronics and computers to advance and participate fully in shaping development. In the context of global competition, information can be used either to promote development or to perpetuate inequality and subordination. The Global Information Infrastructure becomes the primary means through which information and, it could be argued, power is mediated or attained.

Information, irrespective of the channels through which it is communicated is a fundamental resource for development (Kularatne, 1997:117). It is the basis upon which people make decisions. It allows people to communicate with others about their lives and to assert their experiences as valid. Indigenous information, which is usually transmitted through traditional information structures, is highly relevant to people living in the areas in which the information is generated. As the IDRC Gender and Information Working Group states:

> *Acquiring knowledge is the first step toward change, whether this change be technological, social, economic, cultural, legal, or political. Information is the catalyst, fuel, and product of this process of transformation. Inevitably, information systems - both formal and informal - play a central role in our lives (1995: 267).*

Information is thus a value laden and dynamic resource which is produced by people collectively and/or individually on the basis of their experience through what Lepani calls 'brain power'. Its value is derived on the basis of need. Just as the value of information differs from context to context, people acquire and require different competencies in different contexts generating multiple information systems and information literacies. Globalisation apparently connects these different information

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[2] It is important to note that these outcomes relate to performance and emphasise cognitive learning. While there is a trend towards taking into account the experience of the learner as a whole person, it seems that our emphasis on lifelong learning at present is interested in the mental and physical rather than the emotional and spiritual realms of humankind.

[3] The Adamastor Trust is formed by and seeks to promote collaboration between the five higher education institutions in the Western Cape region of South Africa.

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systems and contexts, but as with any physical entity the dominant cultures, systems and values tend to engulf and overshadow leading to a formation/s in which certain competencies and experiences are regarded as superior and desirable. It is precisely through our experiences that we interact with and make sense of the world. When those experiences are undermined and discounted we are stripped of power and have to assume other dominant views of the world in order to gain power and legitimacy. Information literacy develops as we become more conscious and self-conscious of the role and value of information in all its forms in the world/s we occupy. The self-consciousness aspect is what allows us to bring our experiences (our information resources) into contexts we occupy. For learners and teachers alike, this means valuing different experiences and seeing how these enrich our world.

One of the features of the global economy is the perpetuation of inequalities between and within societies. The GIS marks new forms of imperialism with information continuing to flow primarily from the developed to the developing world with minimal flow in the other direction. Thus despite the rhetoric of the global village and inclusivity, it has become evident that if lesser developed countries do not claim their contribution to the GIS, they will not achieve the shift from information consumption to knowledge production. There is now general acceptance that the information infrastructure as a medium is not an end in itself and that the message transmitted is extremely politically and ideologically loaded. The issue of content has thus become ever important. Within this context, it can be assumed that those who generate knowledge and have the competencies to articulate and spread this knowledge improve their capacity to influence decision-making.

Various types of knowledge have been identified including disciplinary or formal knowledge which are constructed through investigations (often at higher education level) in particular disciplines, and tacit knowledge which is embodied in people and accumulated by way of personal experience and acquisition and influenced, obviously, through a range of socio-cultural experiences.

Higher education knowledge production and universal scientific knowledge especially has (a)been highly gender, and (b)assumed and presented itself as ? truth? . As this type of knowledge increasingly faces charges of appropriateness and accountability,

> *institutions will in particular also need to be able critically to evaluate whether, as is often claimed in transformation debates, certain bodies of knowledge in a discipline are global (usually referring to aspects of a discipline that relate to Western society and values) while others are local and therefore presumably of lower intellectual status (Ekong & Cloete, 1997: 5)*

Indigenous or local knowledge systems have to be regarded as part of the GIS not by way of appropriating them, but asserting their place and voice in the GIS. Local knowledge systems bring perspectives that are crucial for globalisation if we are to use the new information and communication technologies (ICTs) for sharing, exploring difference and expanding the ? whole".

Indigenous knowledge systems usually embody complex systems of planning and understanding which are different from systems in Western industrialised nations. According to Appleton et al whereas ? the generation of science and technology is directly linked to centralised control over the distribution of information, information in local knowledge systems is the common property of integrated social groups?

(1995: 57). They go on to argue by drawing on Shiva and Dankelman's work that whereas

> *women's knowledge systems tend to be holistic and multidimensional, the introduction of agricultural technologies usually result in 'resource fragmentation undermining the position of women ... the woman's role becomes more and more that of a labourer as she loses her control over production and access to resources (1995: 59).*

The introduction of systems or ICTs into local knowledge systems in ways that do not comprehend these social relations could, in fact, introduce new disparities. In contexts of gender differentiation for instance, ICT incorporation could disadvantage women and result in their subordination. What seems to be called for is an articulation between local knowledge systems and the new ICTs so that the latter enhance the efficiency, effectiveness, flexibility and sustainability increasingly apparent in the former. Local groups must direct the interface though, to avoid the dangers of appropriation and imposition of power.

One of the implications for learning is that a learner's tacit knowledge is clearly an extremely important yet undervalued part of the learning process. It is this life experience which has proved difficult to integrate into a dominant education culture which assumes that learners are empty vessels that need to be filled with information and knowledge. Taking account of learners' encyclopaedic knowledge means grappling with indigenous information and knowledge systems that often become subordinated by the introduction of new information systems.

These various factors underscore the need for integration of the Critical Outcomes that SAQA has identified in order for learners to acquire the various competencies that allow them to participate in society and assert their experiences as valid. It is these competencies of critical thinking, team learning, the abilities to contextualise and communicate etc. which will ensure that people are mindful of the contexts in which they are learning and the importance of their contributions to a collective pool of knowledge. At the same time, it is important to note that these outcomes are currently considered crucial according to different sets of competing interests. Both sets of interests emphasise the importance of participation with the one stressing information consumption and the other knowledge production.

It is believed that information literacy not only delivers to the kind of skills requirements of the GIS, but that it develops in learners a consciousness and self-consciousness which allows them to:

1. take cognisance of their experience as an information resource, and
2. exercise their critical faculties in deciding how to articulate this experience with the world at large so that they influence globalisation.

It is the latter point which ensures that local knowledge systems are not simply engulfed by larger and, in some respects, more aggressive knowledge systems. Developing country experiences and women's experiences have to be brought into the GIS to make it truly global.

Information literacy theories and practices

Through focus group discussions with key constituents in higher education, INFOLIT has developed a working definition of information literacy. This signals the relation between information literacy on the one hand, and *knowledge production* on the other, and highlights the need to take account of various specific factors, relevant in the South African and indeed the wider African context. These include:

- prior learning experiences
- contextually specific teaching and learning
- affective issues
- access skills
- use and evaluation
- higher order cognitive skills
- student-centred learning.

The INFOLIT definition reads as follows:

> **information literacy refers to the ability of learners to access, use and evaluate information from different sources, in order to enhance learning, solve problems and generate new knowledge** (1997: 2).

Implicit in this definition is the notion of articulating competencies with content. It is believed that learners acquire life skills in the context of learning subject knowledge through undertaking meaningful tasks and activities. The subject knowledge and the information competencies are thus learnt simultaneously. Special note is taken of the fact that in the context of South African higher education, information literacy

> ? develops when situational and affective factors that impinge upon the teaching and learning process are recognised by learners and teachers alike. The development of information literacy is directed towards producing independent and self-directed learners who are able to become active and responsible citizens, make informed decisions in their private and public lives and contribute both to individual and national empowerment and growth? (1997: 2).

While information literacy may not be the only pre-requisite for lifelong learning, understanding it to include a self-consciousness of value of information and learning has allowed INFOLIT to link it to promote other aspects of lifelong learning identified by Candy, Crebert and O'Leary (1994). In addition to information literacy, these include:

> - *a love of learning*
> - *helicopter vision*
> - *a sense of personal agency*
> - *a repertoire of learning skills*
> - *interpersonal skills (Candy, 1996: 142)*

Recent work within INFOLIT has shown that information literacy is context dependent and develops differently in different situations. While we are able to advocate that courses meet particular requirements such as ensuring that their students are able to work with information critically, we are by no means insensitive to the fact that different types of information are appropriate to and used in different contexts. It is recognised that we cannot develop an information literacy blueprint that guarantees the spread of information literacy education across all disciplines. Instead we require guidelines and policy which through modelling various ways of promoting information literacy education illustrate ways of spreading information literacy practice.

At its inception, INFOLIT believed that information literacy could be promoted in a number of ways:

- generic, foundation type courses with a broad content-base
- infusion in specific subject courses
- integrating higher order cognitive skills into more senior undergraduate programmes
- the adjunct model whereby courses draw on the expertise of various academic development groups such as the writing centres to advance aspects critical to information literacy education.

While these were tested to a greater or lesser extent through various pilot projects, the needs assessment study forced a much closer examination of an appropriate understanding of information literacy in the South African context. Throughout this process, INFOLIT has thus needed to attend to the conceptualisation and promotion of information literacy.

Preliminary Findings

Through its various pilot projects, the needs assessment study, conceptualisation and spread of information literacy, INFOLIT has begun to explore issues relating to the development of:

- coalitions and partnerships of academics and information workers in delivering value-added programmes
- content which advances information literacy appropriate to the needs of learners
- CD and Web-based materials which can be used across the region
- collaboration across institutions to deliver foundation-type programmes

Primary lessons

Integration

Information literacy has to be integrated into academic courses for it to make a real difference in the way in which learners are able to acquire and maintain information competencies. Where information literacy remains an add-on, or extra-curricula, learners generally tend to forget these skills very soon after they were 'taught'. It appears that real integration has to do with inserting information literacy into the very content and mode of delivery of a course so that it almost becomes indistinguishable from the subject matter. This kind of integration raises a series of questions about the transferability of 'skills', an assumption we were happy to make in the first few years of INFOLIT's operation. We have also learnt that integration is best achieved when students acquire information literacy competencies through meaningful tasks and activities which have value in their estimation.

Curriculum Development Expertise

Information literacy integration is a pedagogical challenge which relates to teaching and learning. Our piloting experience taught us that because academics are rarely trained as teachers since no professional teaching qualification is required for tertiary instruction, academics are often ill prepared to deal with issues of curriculum development. This means that in the context of the SAQA initiatives which call for the integration of Critical Outcomes into qualifications, academics have to grapple with issues of design and development of curricula – expertise which has largely been gained by education and/or academic development initiatives at the institutions. Part of the complexity of curriculum development seems to be that of finding ways in which to incorporate learners' own information resources into the learning context.

Capacity development of librarians

In terms of capacities to spread information literacy education, it has become evident that the current South African LIS model of training for library and information workers is generally inadequate in equipping librarians to deal with the kinds of curriculum development challenges which allow them to insert information literacy into courses and subjects. Librarians are generally not trained with any discipline specific knowledge which allows them to map and structure knowledge domains. And they also appear to lack the kind of specialisms which qualify them to provide professional input on information flow, sociology and economics of information. Furthermore, the traditionalism and conservatism of the historical LIS sector in South Africa means that we continue to offer authoritarian type courses that attract poor quality students, often opting for LIS as a soft option.

Developing coalitions

In order to develop intra-institutional collaboration whereby different players bring a range of competencies to the development of quality education, the development of coalitions or teams which bridge divides within higher education is crucial. It seems that the divide between the library and academics worlds is in some instances wider than it has ever been and the need to build bridges more of an imperative than ever. Librarians tend to be non-reflexive and are not self-critical so that they often reproduce rather than resolve their marginalisation.

Replication

One of the criteria according to which INFOLIT's pilots were selected was that of replicability in the hope that we would be able to reproduce models of information literacy across institutions and disciplines. We have learnt that it cannot be assumed that a course developed at one institution is portable or that it will not have to be substantially adapted to be taught in a different context. Our experience has shown us that even in terms of materials, the nature of the audience is paramount in terms of design and our student cohorts as well as approaches to pedagogy appear to differ meaningfully across the region. The point about replication is that entire courses if taught in a different context to which they were designed have to take account of difference. In this respect, the models of delivery that can be viewed as templates have become the valuable features of the various pilots.

Regional Collaboration

Regional collaboration is difficult to effect. Senior management is happy to buy into the rhetoric of collaboration, but we have not yet reached the stage where this has become a priority for institutions. Co-existing with the call for greater regional collaboration, there is growing competition emerging between institutions. The imperative to allow students greater mobility between institutions so that they have greater choice about how to make up their degrees still holds and it is for this reason that INFOLIT is striving to achieve, not the same courses between institutions, but certainly a common framework which improves articulation of the institutions and potential for student mobility between them.

Changing mindsets

The problem of developing a critical mass engaged in new styles of teaching and learning has proved important. While INFOLIT has successfully identified champion innovators who are demonstrating new models of quality education, the importance of changing mindsets has proved difficult. The dominant authoritarian culture which reinforces the notion that learners bring very little, if anything, to the learning experience means that there is very little institutional support for the fundamental rethinking that must accompany the development of a lifelong learning framework.

Institutionalising information literacy

Working with institutional initiatives and agendas has proved important. The INFOLIT office stands to face the same criticism as extra-curricula, add-on 'information literacy' courses as long as it stands outside of institutional cultures and practices. In order for our agendas to articulate with those of institutions, they have to be meaningful to the people who are going to become information literacy agents. Integration is thus not simply about course integration, it is also about institutional integration. It is however, important to note that in facilitating 'integration', INFOLIT is promoting its agenda of regional collaboration as well as intra-institutional collaboration.

Challenges

Changing teaching and learning

It seems the most immediate and difficult challenge is that of changing educational culture at the institutions so that those in positions of delivery develop learning spaces in which all information resources including life experience is factored into academic courses. The change of culture is about a change of mindset in which learners and the experiences they bring to education is encouraged and explored. The development of quality assurance measures and processes that assess courses is crucial to the development of a new culture. As important is the ability of teachers to be flexible and to constantly adapt and transform their courses according to changing contexts and needs.

The need for effective evaluation studies

It has become evident that evaluation studies, which measure impact of various learning strategies, especially the information literacy initiatives, in ways that allow for adaptation of programmes, must be developed.[4]

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[4] One of the lessons from INFOLIT is that it is extremely difficult to measure the value of the interventions we are making. How many variables can you be conscious of taking into account when measuring impact and how confidently can you attribute an increase in scores to a singular albeit complex intervention. As one of the pilot project leaders, Brenda Leibowitz states: ? It is almost impossible to demonstrate the impact on learning of this kind of materials design. The more integrated it is, the less it stands out. The less integrated it is, the easier it is to speak about it to students and get a positive sounding response, but the less evident it becomes whether the skills or awareness is being utilised in genuine task completion? (INFOLIT Annual Report, 1997). Conversely, how do we value no change in scores, but an expressed increase in awareness of the role of information as reported by students on the Information Society: Tools and Skills course.

Replication of projects

It has been found that due to the diverse nature of the higher education sector in the Western Cape, it is unfeasible simply to import materials developed for a specific audience at one site to another as the materials are incorrectly pitched and inappropriate to the needs of the ? secondary? audience. In an effort to combat this problem, it is envisaged that materials that are flexible and versatile will be designed by cross-institutional groups of developers in accordance with their local needs and conditions.

Integration and mainstreaming of projects

Converting from a pilot to a programme involves careful negotiation with educational managers and institutional bureaucracies. Negotiating the process whereby pilot projects become mainstreamed is time-consuming and it must be ensured that the new ways of approaching learning continue to be adapted and developed so that they are not only portable but also responsive to the needs of a changing student base and society.

Institutionalisation and Sustainability

It is imperative that investments made in the pilot projects become part of new ways of teaching and learning so that institutions themselves assume responsibility for continuing to improve quality education.

Endorsement of Pilot Projects by Senior Management

The issue of endorsement is linked to that of institutionalisation in that educational managers need to be prepared to invest in new ways of advancing learning which prove successful. Their support is also key in terms of the institutional authority they wield to promote best practice and encourage and fund further information literacy incentives.

Collaboration and partnerships

Overcoming barriers to collaborative teaching and learning is a major challenge. In order to promote programmes that are globally competitive, collaboration which offers a wider-ranging audience and fosters versatile development is important. Collaboration occurs where there is will. These models, where successful, encourage further joint ventures.

Interactive learning

New models of learning require a radical departure from exclusively lecture-based courses to multi-media type learning environments in which learners are encouraged to interact with concepts and information resources to develop their understanding of a subject.[5] Not only do educators/facilitators need to be encouraged in this regard, so do students, at least those who have been domesticated through rote learning and passive environments.

Needs Assessments

The Needs Assessment study that INFOLIT undertook has proved invaluable on at least two counts:

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[5] It appears that one of the imminent challenges in the area of networked learning is the design of flexible learning spaces which are able to expand as new technologies and telecommunication developments introduce value-added features which enhance learning. Thus, for example, learning could become increasingly interactive as bandwidth expands and makes possible the use of graphics and images. The development of such spaces challenges coalitions to transform lecture-based teaching and to develop interactive learning models. It calls for comprehensive or cohesive frameworks in which learners are able to move between information sources, listserves, queries, discussions, exercises and assignments to explore concepts to which they are exposed. This kind of learning ideally removes the barriers be they physical or intellectual, between the learner and the world of information s/he wishes to explore. Implicit in this challenge is that of bridging the historical divides which exist not only between previously competitive institutions but also between compartmentalised disciplines and desegregated functions such as those of information provision and discipline induction.

- it has provided inroads into institutions and allowed participants of focus-group interviews and the survey to interact with notions of information literacy;
- it has provided a substantial base for motivating the need for information literacy interventions to both senior management and educational facilitators.

Promotion and Marketing

Facilitators of learning need to see practical ways of advancing information literacy education. The development of real models that can be critiqued and adapted has proved important.

Human Resource Development

The need for significant capacity development interventions that prepare learning facilitators for the spread of information literacy education is clear. INFOLIT has responded to the need for training of both library and the teaching staff to prepare them for the integration of critical outcomes into qualifications and the evaluation of these.

Inclusion of all players in pilot project formulation and delivery

It has proven important for the successful implementation of project proposals that all players involved in the delivery of information literacy models be incorporated in the formulation and planning of such projects. Experience has shown those errors in these regard results in lack of collective ownership and enhancement of initiatives as well as alienation from and disuse of resources.

Understanding learning

INFOLIT's experience has highlighted the importance of developing a closer understanding of learning and how this takes place since it is through contextual learning that information literacy is acquired. Our hopes have been to find a democratic learning model that can be cloned. However, increasing exposure to learners in common and varied programmes shows that learning styles are individual and often unique. This complicates the tasks of learning facilitators and presupposes their ability to work with a variety of learning process and strategies.

Development of higher order cognitive skills and structured domains of knowledge

The various INFOLIT initiatives have concentrated on the development of generic information literacy education and have not yet addressed the structuring of domains of knowledge. The latter would support the development of higher order cognitive skills and a more advanced understanding of information flow and knowledge production in various discipline areas. Such proficiencies allow learners not only to access more diverse information sources, but also encourage a critical appraisal of and induction into the world of knowledge.

School and community information literacy models

INFOLIT has recognised the importance of expanding our operation at school level so that students become more conscious of their information literacy, bring this into the tertiary environment, and lobby for quality education. A further challenge is that of developing community models that bring information literacy/ies to citizens outside of formal education institutions so that they are able to utilise these competencies in their daily lives for purposes of making more informed decisions.

Conclusions

It has been argued that information literacy education is a vehicle through which life skills for learning and knowledge production will be engendered. The infusion of information literacy into courses, curricula and academic programmes is seen as a means of articulating information and subject knowledge. The development of educational spaces in which learners' experiences and information resources are valued, in which learners' can explore and develop their potentials, in which learning is contextualised, is challenging. An emphasis on outcomes and performance begs the question: "towards what" and the issue of whose agendas set the frames in which we are learning remain pertinent.

In order for the new information infrastructure to aid development by the people, for the people and of the people, it seems imperative that people's capacities are developed to ensure that they can participate in shaping the development of the global information society. The ways in which curricula are developed in response to this need, the ways in which educational systems are designed to address problems of equal access, equity and redress are central to this challenge. Most importantly, the extent to which academics who wield tremendous power within the system are able to shift their mindsets from a notion of "having to teach their students everything" will create the spaces for using the opportunities presented by the formulation of a framework for lifelong learning most productively. The extent to which academics are prepared to become more reflective and self-conscious of their own ongoing learning will influence their ability to engage with students more interactively to create open spaces into which students can bring their own experiences to promote quality learning.

INFOLIT is funded by Reader's Digest

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THE IMPLEMENTATION OF THE GREEK UNION CATALOG

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Introduction

This presentation is based on the results of the study of the Work Group of Bibliographic standards for the Greek Union catalog. This is a project financed by the European Union which aims among others to the electronic networking of Greek Academic Libraries and to the establishment of infrastructure for the implementation of the Union catalog in Greece. The study which is the first stage of the Union catalog development, was entrusted by the Project Steering Board consisting of the representatives of all participating libraries. The study was introduced to the same Board and was passed. The work group decided that it was necessary to be advised by experts, so they had meetings with 3 persons, one from Europe and two from USA, who are experienced to the Union Catalogs setting up and implementation.

1. The objectives of the Union catalog

The union catalog, at the early stage is the result of group efforts on cataloguing of many different organizations. At the following stage Union catalog provide users with the ability to perform consistent searching of records from multiple institutions in the sense that these records are indexed consistently. The goals of the union catalog are:

- Cataloguing most cost effectively,
- Increase the supply of quality records, both bibliographic and authority ones,
- Develop and maintain mutually acceptable standards,
- Increase the access and sharing of the bibliographic and authority databases of the participant libraries,
- Development of an interlibrary loan with real access to the collection material and document delivery system,
- Development of joint collections, printed and mainly, electronic ones,
- Links to document suppliers and electronic journals,
- Use of shared resources,
- Ongoing discussion, planning and programming among participant libraries,
- The production of the National Bibliography in electronic form.

In a few words, the union catalog is a shared bibliographic database of all items in Greek libraries and their location, and it was to be a common network linking all libraries to one another, offering shared functions for interlending services, shared cataloguing and access to foreign databases.

2. The state of the art of Greek Academic Libraries

The current state of Greek Academic Libraries shows some oddities which can be summed up in the following brief analysis:

- Lack of a coordinating body and cooperation mechanisms. So there aren´t collective common decisions for the implementation of common accepted standards. National Library is not able up to the moment to undertake the substantial leading role in the Libraries community.
- Variety of automated systems. The automation of the libraries was accomplished relatively with

great delay of these of European Union countries and was the result of individual efforts. As a consequence, the chosen library softwares have different potentials, use different MARC formats and supports either all or a part of an online system modules.

- Cataloguing rules. The general standard used for cataloguing is the Anglo American Cataloguing Rules". The level of the implementation and the rules interpretation doesn't appear any consistency, since it has not been agreed or dictated by a national decision making committee.
- The use of standards related to bibliographic records is neither spread nor standardized. The Bibliographic records of non-greek material are purchased by foreign organizations. The cataloguing of greek material is accomplished individually by each library.

Uniformity problems cause the main difficulty to the setting up the union calalog. These problems are listed below:

The interpretation of cataloguing rules and the using sources,
The level and the quality of cataloguing,
The lack of standardization on holdings entries,
The language of the field of notes for non-greek material,
The use of names, corporate bodies and geographical terms.

- Authority records: subjects and names *Subjects*
  The Academic libraries had to face the subject analysis of material without authoritative greek schedules. As a result we have the following formation:
  - **Foreign language material**: Language of subject Analysis: English: Source,Library of Congress Subject Headings.
  - **Foreign language material**: Language of subject Analysis: Greek: Source, National library and individual translation of the Library of Congress Subject Headings.
  - **Greek language material**: Language of subject Analysis: Greek: Source, National library and individual translation of the Library of Congress Subject Headings.
  - **Greek language material**: Language of subject Analysis: English: Source,Library of Congress Subject Headings.
  - **Greek language material**: Language of subject Analalysis: English and Greek: Source: Library of Congress Subject Headings, National library and individual translation of the Library of Congress Subject Headings.

  Names
  The name authority files of Library of Congress are used mainly for the authorization of foreign language names. For the greek names there is a variety of sources that are used, since the authority files of the National library are deficient and they can't be crossed with bibliographic records.
  - MARC Format. Two MARC formats are used: UNIMARC ?a? USMARC. Due to recent technological evolutions, this difficulty can be overleapt.
  - Collaborations and networks. Since early sixties the greek library community has seeked forms of collaboration and the creation of the ptinted union catalog. Due of the lack of coordinator and funds, these goals were never achieved. Nevertheless, the following evolutions are noticeable:
    1. The union catalogue of periodicals which is established by the National Documentation Centre, is an official form of collaboration for the interlibrary loan.
    2. A network of archaeological libraries is in progress.

3. Implementation models

A Union catalog is presented to its users as a high-quality management information access system. This means that the system should meet standards for reasonably rapid and predictable response time, high availability and reliability, and good communication about outages; and the user should expect its behavior to be highly repeatable from session to session. There are two options of the organization of the catalog: the central and distributed one. The above referred situation of the Greek libraries persuades us to lean towards the central administration scheme because it offers:

- stable collection,

- basic, centrally managed tools for cataloguing,
- possibilities for off-line pre-processing of records during loading of data,
- consistent index generation,
- single search engine with dependable mapping of search keys to indexes, high level of repeatability,
- central control of quality and performance. [1]

Two basic models of implementation can be applied for the creation of a union catalogue:

1. Master Union Catalog. The participating institutions catalogue their material to the central database and then load to the local databases the new or modified records.
2. Slave Union Catalog. The participating institutions catalogue their material at first locally and then load the new or modified records to the central database.
   It is obvious that the appropriate model for Greek union catalogue is the Slave one, but the administrative system of the union catalogue could at the same time play the role of the master union catalogue in order to support smaller libraries without local automated systems.

4. Implementation phases

In order to be achieved the function of an online union catalogue, the implementation defines two phases:

4.1 Formation and homogeneity of primary database

The first phase demands the loading of the existing local bibliographic records in the central database, regardless their quality (description level, cataloguing practices), and their elaboration, that is uniformity, identification control and merging of multiple records, as well as authority files development.

4.2 Function and updating of the union catalogue

The second phase demands the standardization of cataloguing practices and bibliographic entries, the standardization of the procedure of practical updating of the union catalogue. The standardization will derive by the collaboration of all the participants and the experince obtained by the first phase of implementation.
These phases don´t function as separate, distinguished and successive stages. They simply orientate the elaborations which are necessary to be done by both central and local organizations.

5. Specifications, required for the Union catalog system

For the realisation of the central Union Catalog, a software and tools are needed, either a new development or a pre-existing one. Detailed requirement specifications will be produced for a call for tender with identification of the priorities of the requirements. Anyway, the work group of bibliographic standards noticed that, as the status of the Greek libraries is somehow confused, the group feels obliged to notice emphatically some points, which according to its opinion are significant.

Records Format The majority of bibliographic and authority records at the existing local systems have created or can be exported in :

a. UNIMARC (Bibliographic êáé Authorities)
b. USMARC (Format for Bibliographic Data êáé Format for Authority Data)

It is then required, the union catalogue automated system to support import and export data in USMARC and UNIMARC, regardless the internal format it supports. It is also required the ability for management of both MARC formats or the dynamic conversion from a format to another.
The local systems should support import and export data in one of these formats.

Quality control of records
The system ought to support error control on content designators level and data, before the records confirmation. It is also necessary the use of normalization schemes regarding to discrete points and punctuation points.

Multiple records identification
It should be developed or improved an algorithm of tracing multiple records in order to match to the particularities of local bibliographic data, because of:

a) lack of control number (ISBN, LCCN)
b) inconsequence of the forms of headings (names, subjects, etc)

The data model
There is a need for definition of the content and structure of the database as well as the relationships between bibliographic data, authority files, abstracts and full-text.
Three are the methods of dealing multiple records:

a) A record is chosen to be the master record, and the rest are deleted.
b) All the records are mainted and are grouped under one master record.
c) A record is chosen to be the master record, but the fields which appear differentiations from the respectives of the main entry are summed up to it. [2]
In the case of the Greek Union catalogue the second method is recomended. The criteria of choice of the master record should be the cataloguing level and the enter time.

6. Standardization

The procedure of creation and updating of a central bibliographic database requires standardization not only in general terms but even in the dynamic and continuous interpretation of rules and the adjustment of these standards and rules. The list of standards which the union catalogue should be used is long, but its´ also further than this proposal. These standards are registered as appendix to the study. Here briefly are referred:

- bibliographic standards,
- technical standards (communication protocols, standards for the retrieval at the central system, standards for export and import of bibliographic data).

Bibliographic standards

- Cataloguing rules
  The Greek translation of the Anglo-American Cataloguing Rules, 2nd ed., 1988 rev. (AACR2) is suggested to be used. [3]
  A Standing Committee of Cataloguing constituted catalogers of participant libraries, is going to take decisions on rules interpretation and the consistency of their use.

- Core record
  In order efforts of collaborating cataloguing to be facilitated on national and international level, the trend of simplification of cataloguing rules is spread worldwide. Nevertheless, the needs of the catalogues users for quality records and stable form of the accessing points (authority control) are not overlooked. So, a new level of bibliographic record was created, which provide accurate identification and retrieval of bibliographic records. It is a less than a full standard record but more than the minimal level standard record. [4]

Authorization of Names and Subjects

Updating to the greek and foreign sources which consist the reference tools by subject for the name and subject authorization. Union catalogue is proposed to fill the gap of national authority files via the

collaborative procedure and collective responsibility.
To the creation of the name authority files more institutes could participate in a common accepted basis, without central control. There is also the possibility of the automatically creation of authority entries, in a minimal level, either locally or centrally and the possibility of the automatically proposed authority entries. [5]
At the second phase the local systems have to be consulted by the central authority records before authorizing locally a term. The new authority records:

> a) will be created locally according to the above mentioned standards and sources as well as the practices which will be developed and submitted to the central file. The presupposition needed is the ability of library' s system to support the authority's creation and staff trained in authorization procedures.
>
> Or
>
> b) will be created centrally after the suggestion of the individual library.
> The creation of authority subject headings in a consistent connecting structure requires central control or at least superintedence. The authorization of serials is a special topic because of the problems they appear, as the definition of the multi-volume document, the serialty of many kinds of documents and the different approach of every format, UNIMARC and USMARC for authority records. [6]

Holdings

Information on holdings are decided as essential because the union catalogue is intended to support shared collection policy, ILL and document delivery facilities. In order to take advantage of relationships among libraries, it is essential to reorient collection development.
Cooperative collection building must become more than just a myth; libraries need to embrace a plan to collectively meet the needs of their users. Librarians should move past thinking in terms of "my patrons" and begin develop a shared vision around meeting the needs of "our patrons". There is need right now to address this issue locally, regionally and nationally. Collection building needs to incorporate consortial, regional and national efforts to build comprehensive holdings collectively with a commitment to provide access. [7]
The holdings description is not satisfactorily developed up to the moment, as UNIMARC, in opposition to USMARC, neither supports a separate specialized format for this data nor includes special fields in bibliographic record but allows the usage of 9xx fields for local informations.
It is strongly recommended to participants to apply the The ISO 10324 standard to local automated systems. The union catalogue should have the ability of holdings management either they are included in the bibliographic record or they consist a separate entry of local information.

Interlibrary Loan

The union catalogue, during the first phase of implementation, has to support ILL requirements for books by e-mail or fax. The bibliographic informations of ILL applications must be compatible to **ISO 8459-1**.
At the next phases the system is going to support the ILL requirements directly from users to participant libaries, as well as the application of ISO ILL protocols.

7. Education and training

The continuing education and training of the staff of the university libraries is the necessary tool for the implementation of the union catalogue. The most important fields on education are:

- Principles and practices of collaborative collection development
- Electronic exchange of bibliographic data
- The authorization of names and subjects

- Authorization of subject headings and references
- MARC authority
- Core record
- User support and training
- Continuing education on topics relative in every stage of the implementation of the union catalogue
- Library management

8. Administration scheme

For the development, management and implementation of the Union Catalogue it is necessary a consortium to be established. It will be a non-profit organization which Academic libraries and National library are going to participate firstly in. It will be directed by a project manager with proven experience in managing complex projects, and also knowledge of the issues of library cooperation and union catalog implementation. An annual fee is paid by every institution to the Consortium for the functional expenses of the Union Catalogue. There will be a charge on a use basis per research. The consortium will be able to produce and dispose bibliographic subject material in printed or electronic form.
The Project Steering Board consisting of representatives of all participating libraries allready exists and has appointed an Executive Group of its members. The manager will be referred to the Executive Group which members are coming from Academic institutions-members of the consortium.
Standing work groups consisted by experts in various specialized areas from the participating institutions and libraries, will elaborate the topics relevant to the investigation, evaluation, implementation, standardization and adoption of rules and procedures.
It is obvious that the remained Greek libraries, research and public, will participate in Consortium in a later phase.

9. Project phasing

The carrying out of the project includes five actions which correspond the five basic subjects of it and its management.

1. Management of the project
1.1 Setting up of the Consortium of Academic Libraries.
1.2 Organization of the department for Research and Statistics on Academic Libraries.
1.3 Project management team, consisting of a full-time project manager, supported by a deputy and secretariat.
2. Union Catalog of Academic libraries
2.1 Study and analysis of existing library automation systems and networking
2.2 Drawing up of specifications of the system
2.3 Analysis of a sample of Bibliographic data of each library
2.4 Development of software and hardware specifications for the Union Catalogue
2.5 Purchase, maintenance and amortization of hardware and software
2.6 Cataloguing standardization
2.7 Study of the process of authority files of names and subjects with a narrow pilot application
2.8 Pilot application
2.9 Suppy, installation and disposition of Bibliographic support tools
2.10 Running system
3. Training of libraries staff
4. Rational use of the Scientific periodicals collections of Academic Libraries
5. Creation of a distributed electronic unit of gray literature

Conclusion

After the project´s completion a significant quality step will be achieved of the area of Greek Academic libraries infrastructure, at the means and feasibility of accessing and researching bibliographic data and librarians training and education. At the same time, this will be the starting point of a continuously concurrent and renewable, according to the international developments, system. Indicatively, the following results are mentioned:

1. The academic and research community will obtain an important efficient and significantly useful tool, that is the ability of concurrent access to bibliographic data, regardless of its location and form.
2. The academic and research community will be able to classify, search and generally access to the available by the libraries knowledge, in a uniform way on national range, as well as to loan through the ILL the desirable material, regardless the form or the geographical distribution.
3. The above will result the creation of significant infrastructure and the feasibility of the Research and Development Projects in Greece, which meets a great deal of problems due to the lack of network connection and other problems libraries face.
4. At the same time, there will be great quality and quantity access to knowledge for the academic personnel and researchers of every stage.
5. There will be more efficient management of financing sources of libraries, as the shared collections would avoid coverings by increase on ILL.
6. There will also be better exloitation of manpower and their use for new services by reduction of double work of cataloguing and increase of productivity.

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Back to contents

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USER ACCESS TO THE HYBRID LIBRARY

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Introduction

The concept of the Hybrid Library which has already been described in previous papers by Leo Waaijers [1] and Michael Breaks [2] , has arisen from the recognition that our libraries now offer a changing mixture of paper and electronic resources. Paper currently provides the majority of our resources, over 95% in most libraries, and will continue to do so for the next decade though the electronic to paper portion may be different for (say) a geneticist and a historian. In the immediate future the electronic journal has the potential to make the greatest impact on these relative proportions though whether as an addition to, or a replacement for, the paper journal, remains uncertain.

Distributed access is a key characteristic of electronic resources. A paper document is accessible only in the library that holds the subscriptions, with photocopying as a partial means of distribution. An electronic resource is in principle available throughout the academic community from workstations attached to the network in Departments, Faculties and Colleges, at home or when visiting another Institution. In practice access may be restricted. Some products are still only available on PC platforms, though this restriction is being progressively removed, and access is still dependent on wide availability to undergraduates, research and teaching staff of workstations in sufficient number and with the right specifications.

The pace of change in the mixture of electronic and paper sources since the beginning of the decade has been very rapid. The introduction of new electronic resources has often been opportunistic, sometimes experimental, and somewhat disorganised. The challenge which we are now facing is to develop the necessary management, organisational and technical structures and personal skills to provide an effective Hybrid Library service which can readily adapt to continuing change in the mixture of paper and electronic resources. We need to present to the user a coherent picture of what resources are available in paper or electronic format. As an illustration, a user wishing to consult an article in The Journal of Biological Chemistry must be informed that the quickest route is to the electronic source from workstations on their office desk and made aware of how to access and use this resource. Having found the required article, the same user should have attention drawn to other electronic and paper resources with guidance on how to find and use them.

The Oxford environment

Oxford University offers an exceptionally rich, diverse and sometimes fragmented range of paper and electronic sources, with access sometimes far from transparent to the user. A paper resource of c. 7 million volumes and c. 200,000 manuscripts is distributed among 100 library units varying from the Bodleian Library (itself located in 7 units), an international library of reference with a staff of 400, to departmental and college libraries with a staff of 1 or 2 only. These libraries may be designed to serve the subject needs of a department or faculty, e.g. physics, a user group, e.g. undergraduates or researchers, or a function, e.g. lending. This distribution and diversity of resources gives rise to problems of duplication and fragmentation with many users having recourse to more than one library. Within this system, the Radcliffe Science Library's contribution is as science section of the Bodleian serving both undergraduates, research and teaching staff. Its role in the sciences is complemented by some 20 departmental collections.

The electronic resources that are available include:
a catalogue of over 3 million items from over 70 libraries, accessible from the GEAC Advance OPAC and a well-advanced retrospective conversion project. Until this conversion is complete users must continue to consult the card as well as well as the electronic catalogue. Separate electronic catalogues for Japanese and Chinese material are available on different platforms.

80 bibliographic and full-text databases mounted on local servers attached to the University network. These databases are mounted on two platforms. SilverPlatter's Electronic Reference Service (ERL) provides a common interface for thirteen databases, including a cluster of the major databases in Biomedicine. An NT/Novell platform provides for a second range of products, each mounted on its own proprietary software, including Chemical Abstracts.

Services provided by remote hosts including the Bath Information Data Service (BIDS), Manchester University's MIDAS Service, which offers Beilstein's CrossFire, and OCLC from the United States.

750+ full-text electronic journals, including those obtained from the Pilot Site Licence negotiated nationally by the Higher Education Funding Councils, from the SuperJournal Project and from individual publishers. Most of these products are associated with printed subscriptions, are experimental, and available without additional cost though this is expected to change dramatically in 1999. We are in the progress of moving from an acceptance of whatever is on offer to identifying what we want and subscribing accordingly.

A rich variety of Web services in Oxford both within and without the library sector.

Resources freely accessible on the Internet via Web browsers. Identification of relevant sources is being aided by the development of gateway services such as EEVL (Edinburgh Engineering Virtual Library). [3]

For the humanities, the Humanities Computing Unit provides the Oxford Text Archive of some 3,000 titles.

New developments in progress are projects to digitise our own stock, including the provision of electronic reading packs, and the creation of electronic catalogues of manuscripts. In comparison with the size of the paper holdings, progress so far in both areas represents a minuscule proportion of the total.

Hybrid Library design

Most of our library systems will offer similar changing mixtures of electronic and paper resources, continuing new developments, and similar problems in offering guidance to the intending user. A strategy for Hybrid Library design and organisation which provides the user with coherent, easy-to-use access to both paper and electronic resources has three essential elements:

- a configurable entry-level menu for all applications.
- functional integration of applications to allow the user to move directly from one source to another without having to exit one application before re-entering another.
- the linking of guidance to paper and electronic resources.

Most progress has been made in achieving the first requirement and we can offer an example of a first generation entry-level menu; the acceptance of standard protocols and modules from individual suppliers are laying the ground for the second; our thinking about the third requirement, the linking of paper and electronic sources, is still at an early stage though some of the ideas and elements are already there.

A configurable entry-level menu

This is the area in which we have made most progress to an extent of creating a first generation system still requiring much development and improvement. Oxford has developed a WWW application, OxLIP [4], comprising a simple hypertext menu system for some 200 bibliographic and full-text databases available on campus, mounted on either local or remote servers. The menu system is available from reader workstations in most of Oxford's libraries and an increasing number of workstations outside libraries in departments, faculties or colleges. The three main elements are a Subject List (Figure 1), a Title List (Figure 2), both of which are common to all implementations, and a Local Menu (Figure 3) which can be configured for the requirements of a particular library or even an individual. Each menu is accessible by a single click from the others. Links are also provided to a listing of electronic journals and to Web navigating tools.

Users will approach entry-level menus with information requirements ranging from the simple to the complex, and with knowledge of subject area or information sources in a subject area varying from minimal to extensive. Step-by-step routes and careful instructions may annoy the expert; short cuts and minimum instructions can be opaque to the uninitiated. The Subject Listing (Figure 1) is designed for the user who has a subject requirement but has limited knowledge of subject sources in the area, or wishes to view alternative sources, or has a special requirement which is not catered for by known sources. By way of example, a click on Medical Sciences produces a list, in alphabetical order, of databases that could offer relevant sources in this subject area (Figure 4). Such subject lists are not exclusive. Chemical Abstracts appears in the Physical and Mathematical Sciences and Earth and Environmental Science as well as Medical Sciences lists. A click on MEDLINE in the list of medical sources produces a full-page description of the database. The icon attached to the database is an indicator of the platform on which the database is available, in this case locally networked ERL service. A click on this icon produces the entry screen for ERL with a list of databases available on that platform. A further click starts ERL; and offers a choice of MEDLINE files for different time periods and of other files that are on offer. A limitation of the present technology and the menu system is that you cannot click on a database and immediately start the searching of that database. An intermediate step (and another click) is the front page for the platform application. Where a number of databases are run on the same platform, the user who has already nominated a database has to do so again. There is a converse advantage: the platform may offer the user the opportunity to search across several databases at the same time.

The Title List allows the user to search for a database or platform by name. MEDLINE appears in this listing sandwiched between Medieval Bibliography and Metadex. A hypertext link from MEDLINE enters the same MEDLINE page as the Subject Menu, but in one stage instead of two. The Title Index is designed to be inclusive in its terminology recognising that a user may think of an information source in terms of either the name of the database or the platform name, in abbreviated or expanded form, or alternative synonyms. For example, the entries for Science Citation Index, SCI, Institute for Scientific Information, ISI and BIDS will all lead the user in either one or two stages to the BIDS platform from which the ISI datasets and other sources are available. In this instance the user meets one of the common barriers to the use of a service, the need to input a username and password.

The third element in the hypertext menu system is the Local Menu configurable to the needs of a library or reading room. As an example, Figure 3 shows the Local Menu for the Radcliffe Science Library which lists platforms and sources likely to be of interest to science users. It offers the quickest way to an information source for the experienced user who knows what resource they wish to access and where it is. A single click will take the user to the ERL platform, to the Chemical Abstracts database or to the BIDS platform. The Local Menu also serves as a means of alerting users to new sources or methods of access, as they become available. The Radcliffe Science Library Local Menu has grown steadily over the past two years, is still evolving and is in need of restructuring. An on-going task, to which many librarians have contributed, is the creation and maintenance of descriptions to the databases available on the menu system.

Subject and Title listings are still available from the Local Menu and allow the users, who may be experienced with science databases, to go to other subject areas with which they are not familiar. The chemists can bridge the culture gap by sampling the Dead Sea Scrolls and the Illustrated Incunabula Short Title Catalogue and the classicists can discover Chemical Abstracts. The menu system therefore contributes to browsing and serendipity.

All three menus provide a hypertext link to a list of 750+ full-text electronic journals currently available from the Oxford site though many of these are still "on trial". This is an alphabetic list in title order with the name of the supplier offering access which may be a publisher's name, e.g. Academic Press, or a service such as OVID or BioMedNet, and a hypertext link to the server on which the journal is mounted. What the user often asks for, and is not normally on offer, is access to a single title by-passing the platform entry requirements. For example, a click on Development Biology (Academic Press) takes the user to the Academic Press server where the title has to be re-selected from the list of the publisher's titles. Electronic newspapers and other news sources available to the University are accessible from a similar list. Also available from Subject or Title listings is a Web navigating tool, OLIG (Oxford Libraries Internet Gateway), which gives access to individual Web sources, to gateways such as EEVL and to Web search engines such as Alta Vista and Yahoo.

Functional Integration

The term Functional Integration has been adopted to describe the second requirement for easy-to-use access to electronic resources. A user should be able to move from one resource to another without the need to exit one application and then to locate and enter another. For example, if a search of Chemical Abstracts yields an article from the Journal of Biological Chemistry, the present system requires the user to exit from Chemical Abstracts, locate the journal listing and then select the Journal of Biological Chemistry. The preferred strategy is a hypertext link from the bibliographic record to the full text.

For example, in a functionally integrated system a search of a bibliographic database might give rise to the following sequence of hypertext links to guide the user through available options:

Bibliographic reference (with abstract)

I

Local Catalogue

I

Electronic text of full article (if there is one)

I

Shelfmark to paper journal (if there is one)

I

Loan, photocopy or electronic copy request to an on-site library

I

Interlibrary loan request (if there is neither an electronic nor a paper copy)

Similar sequences would be available from other starting points in the chain. Individual suppliers have already developed modules that could contribute to such a system. For example, the OVID Biomedical service offers links from MEDLINE and EMBASE to the full text of some 70 core journals. In most instances, only a small proportion of articles retrieved by a subject search of MEDLINE and EMBASE will be in these journals and therefore immediately available to the user as electronic full-text. SilverPlatter's SilverLinker will offer similar possibilities. Other services are offering links from bibliographic records to document delivery requests. In future we would expect to see all electronic sources accessible on campus recorded in the local catalogue, which would provide the focus for an integrated system, with hypertext links to the electronic originals.

Adherence by individual software suppliers to common standards such as Z39.50 and the Web, coupled with a commitment to an open systems approach are essential. Even if standards are adhered to, there is a danger that suppliers will prefer proprietary solutions to genuinely open systems, for example, a Web gateway to a Z39.50 OPAC instead of a Z39.50 compliant OPAC. The proliferation of closed proprietary systems must be avoided if we are to create a functionally integrated system from a range of modules provided by different vendors. Such a system would allow (say) a hypertext link from an electronic journal description in a local catalogue to the full text of an electronic journal held in the OVID Biomedical collection and thence from a reference in an article in this journal to the full text of the cited article in an electronic journal provided by OCLC, by a subscription agent or a by a publisher.

Links between electronic and paper collections

The bridging of the discontinuity between paper and electronic resources may be the most difficult step in organising a Hybrid Library. Access to information in electronic collections is no longer confined to the library but is potentially available from any workstation attached to the campus network. However, in many cases the outcome of an electronic search is that the reader requires access to a physical item whether book, photocopy, offprint, manuscript, museum artefact or recording. For stock that exists only in paper form there comes a point at which the user passes from the electronic resource on the workstation to a paper source on the shelf. A balance therefore has to be struck between the user coming to the library, the paper coming to the user, or an electronic version of the paper coming to the user. Organisation and copyright issues are likely to be more significant than technological ones. An integrated approach is required to the organisation of both electronic and paper resources. Electronic resources should direct the user to the right place in the right library, as hopefully do shelfmarks in the catalogue and, where appropriate, paper libraries should direct users to the electronic resource. To build this model we have to view electronic and paper resources together rather than separately, and adopt a common approach to guiding the user to either. This will require the introduction and extension of new electronic elements including digitisation-on-demand of our own stock - and resolving the related copyright issues; and extended messaging and electronic guidance systems.

User input

The design of all elements in the system: the entry-level menu, functional integration and links between electronic and paper collections, must be informed by a much greater knowledge of how users interact with both electronic and paper resources and what makes interfaces easy or difficult to use. This includes the recognition that the electronic medium is very good at sophisticated searching, rapid retrieval and distributed delivery but less good at displaying documents.

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Figure 1: Subject List Figure 2: Title List Figure 3: Local Menu Figure 4: Excerpt from the Medical Sciences Subject List

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Back to contents

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IATUL

RIDING THE TECHNOLOGY WAVE

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1. Setting the scene

- In 1965 Thomas Merrill and Lawrence Roberts created the first WAN by connecting two computer like devices, TX-2 in Massachusetts to a Q32 in California, with a low speed dial-up telephone line. Today 33 years later we are all familiar with the Internet, a WAN interconnecting more than 30 Million computer devices world wide.
- It is estimated that the average GM car on the road today has more computing power than the vessel that made the first lunar landing in 1969. Then lets not even begin to contemplate the vast amounts of computing power on our desktops today.
- The first Intel processor in 1971 (The 4004) had a total of 2300 transistors in the chip. The current Pentium II processor from Intel has over 7,5 Million transistors and are believe to have increased 3200 times in 26 years. The speed of these processors has increased from ,108MHz to 300 MHz with the latest releases believed to be even faster.

2. The birth of the Microcomputer

2.1 Semiconductors

- In 1947 three scientists at Bell Telephone Laboratories, William Schockley, Walter Brattain and John Bardeen demonstrated their new invention the point-contact transistor amplifier. And in 1948 Bell labs filed for a patent on the first transistor.
- 1959, January and Texas Instruments announces the discovery of the integrated circuit
- Also in 1959 (July) and Fairchild Semiconductor files a patent application for the planar process for manufacturing transisters. The process makes commercial production of transistors possible and leads to Fairchild's introduction, in two years, of the first integrated circuit.
- Also at Fairchild Semiconductor, Robert Noyce constructs an integrated circuit on silicon with built-in metal, conductors, transistors, and resistors.
- And finally in 1964 Texas instruments received a patent on the integrated circuit.

2.2 Microprocessors

Definition:

A microprocessor is an integrated circuit built on a tiny piece of silicon. It contains thousands, or even millions, of transistors, which are interconnected via superfine traces of aluminum. The transistors work together to store and manipulate data so that the microprocessor can perform a wide variety of useful functions. The particular functions a microprocessor performs are dictated by software.

Moore's Law

In 1965, Gordon Moore was preparing a speech and made a memorable observation. When he started to graph data about the growth in memory chip and Integrated circuit performance, he realized there was a striking trend. Each new chip contained roughly twice as much capacity as its predecessor, and each chip was released within 18-24 months of the previous chip. If this trend continued, he reasoned, computing power would rise exponentially over relatively brief periods of time.

Moore's observation, now known as Moore's Law, described a trend that has continued and is still remarkably accurate. It is the basis for many planners' performance forecasts. In 26 years the number of transistors on a chip has increased more than 3,200 times, from 2,300 on the 4004 in 1971 to 7.5 million on the Pentium® II processor.

2.3 The Microcomputer

It was in November 1971 when Intel introduces its 4-bit bus, 108-KHz 4004 chip - the first microprocessor. Initial Price was $200. Speed is 60 000 operations per second. It uses 2300 transistors, based on 10-micron technology. It can address 640 bytes. Documentation manuals were written by Adam Osborne. The die for the chip measures 3x4 mm. Intel announces the first microcomputer, the MCS-4 system. It uses the 4004 microprocessor, 4001 ROM chip, 4002 RAM chip, and 4003 shift register chip.

- In April 1974 Intel releases its 2-MHz 8080 chip, an 8-bit microprocessor. It can access 64KB of memory. It uses 6000 transistors, base on 6-micron technology. Speed is 0.64 MIPS.
- Despite being US$300,000 in debt, Ed Roberts is able to borrow an additional US$65,000 from the bank to complete work on what would be the Altair.
- Popular Electronics publishes an article by MITS announcing the Altair 8800 computer for US$439 in kit form. It uses the Intel 8080 processor.
- The Altair pictured on the cover of the magazine is actually a mock-up, as an actual computer was not available. Railway Express loses Ed Robert's only prototype Altair computer, en route to New York for review and photography for publishing by Popular Electronics.Les Solomon, publisher of Popular Electronics, receives Altair number 0001.
- The 12 year old daughter of Les Solomon, publisher of Popular Electronics, suggests the name "Altair" for Ed Robert's new microcomputer. Altair was the name of where Star Trek's Enterprise was going that night on TV
- In February 1975 Bill Gates and Paul Allen demonstrates their newly written BASIC interpreter for the Altair. The software was licensed that same month to MITS. This was the first computer language program written for a personal computer.
- Things then started to take off for MITS who announced in March 1975 at a microcomputer hobbyist club that they had already 4000 orders for the Altair. A Month later Gates founded Microsoft and MITS delivered their first generally available Altair 8800. In May 1977 a company called Pertec buys MITS and its Altair stock for over $ 6 Million.

The PC as we know it today:

Today 27 years later the PC as it is now known has become a tool without which basically no business can do without. And in contrast to earlier predictions has also become part of most households. Processing speeds are up to 300Mhz per device, the BASIC program is long forgotten and operating systems such as Windows NT and Windows 97 is now in the order of the day.

We have in a short period of time learned to become used to Processor speeds of up to 233 MHz, disks of up to 2 Gb, Memory of 32 Mb and more, CD-Rom drives, VGA monitors and Windows based applications. I often still wonder whether the development of new operating systems, which are more resource hungry, are not perhaps a conspiracy between hardware and software manufacturers to ensure their future business.

3. The creation of the Internet

While the above mind blowing developments have taken place networking of computing devices and the quest to create an internet like network has also been progressing at a rapid speed.

- In 1962 J.C.R Licklider discussed in a couple of papers what he called the "Galactic Network". He envisaged a globally interconnected set of networks through which everyone could quickly access data and programs from any site. In spirit this concept was very much like the Internet of today.
- In 1969, four host computers connected and ARPANET (Advanced Research Project Agency) was off the ground. Even at this early stage, networking research incorporated work on the underlying network and how to utilize the network. It is believed that the ARPANET grew into what is know as the Internet today built on the principle of open architecture networking.
- In the mid 1970's computer networks began to spring up wherever funding could be found for this purpose. So it happened that in 1981 BITNET (because its time network) was formed. Started as a cooperative network between the City University of New York with the first connection to Yale. It provided for electronic mail and listserv servers.
- Then in 1982, after TCP/IP (Transmission Control Program / Internet Protocol) was already adopted as a defense standard in 1980 it was adopted by ARPANET. With this smooth transition button were distributed saying "I survived the TCP/IP transition). Today this standard is widely implemented and part of most if not all computer communications systems.
- In 1992 the number of hosts connected to the Internet breaks the 1 Million barrier, and six years later in February 1998 the 30 Million barrier was broken showing the enormous growth of the Internet as we know it today. With the inception of the WWW in 1991 believed to be playing a mayor role.

4. Where we are today

- Host count: 30 Million
- Domains: 1.6 Million
- WWW Sites: 2.3 Million
- Users :who will ever know ?

4.1. Uses for the Internet

E- Mail
Listservs (User and discussion groups)
WWW
  - Social and Entertainment
  - Business, research and general information
  - Accessing Online services and the Intranet

FTP and Telnet

5. Some Pressing issues

Although the Internet has evolved with such a rapid speed, and has become part of our daily lives and business we would have to be honest and, dare I say consider or at least ask some questions:

- Why are most publishers starting to make information (Journals and databases) available on the Internet ? Is it truly because they believe it is a better distribution medium or is it perhaps because the competition is likely to. Or perhaps because the users are asking for it?
- E-commerce is a big buzzword, banks are starting to go online, you can pay your home lone, transfer funds, check your financial portfolio. But still there is a long queue in the bank at the teller, not to mention at the ATM
- With so many electronic resources on the Internet, with e-mail such a powerful tool, not even to again mention the power of the applications on your desktop, how is your progress in moving towards the paperless office.
- Possibly one of the most welcome changes that has become part of our lives since the reality of the Internet is the office without walls, the home office and then the ability to take your office with you wherever you may go.
- Have us " Techno freaks " created the Internet and the rest of society is now trying to find applications for this creation in an effort to justify its existence.

6. Something New Perhaps ?

Riding the technology wave, makes me think of a surfer surfing a wave. He knows where he is heading (to the beach), he thinks he knows how to get there but he remains constantly aware that he or she may fall at any time. Lets look at the future and how we are progressing in reaching the beach, which I'm afraid might move away because of currents even though we think we are moving faster towards it.

New Application:

- Shopping, from groceries to cars to homes
- Online bookings and reservations
- Distance learning and conferencing
- Video over the Internet
- The Internet telephone
- Virtual libraries
- Vast amounts of Information and getting more
- 3 D on the WWW

New Technologies

Will your TV satellite (or perhaps cable TV node) decoder become your Internet link ?

7. The Future ?

- Is it perhaps true that the Internet and technology is starting to move faster than what we as humans, therefore social beings, can and are prepared to handle.
- Will the telecom providers of the world be able to sustain the ever increasing demand for bandwidth to be able to make the future applications a reality. Or will we again see incredible growth, perhaps this time in wireless communications such as Satellite and Cellular communications.
- Or will this explosion in technology perhaps again remind us of our need for human interaction

and therefore strengthen services based on human interaction with a higher emphasis on customer service.

- I personally believe that the future and outcome of riding the technology wave will depend on the same factor that keeps the surfer on his board till he reaches the beach, which is **balance**. If the Internet stumbles, it will not be because we lack for technology, vision, or motivation. **It will partly be because we cannot set a direction and march collectively into the future, but most importantly it will be because we were not able to set the balance between technology and its impact on the social needs of us as humans.**

Back to contents

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IATUL

LIBRARY RESOURCE-SHARING IN THE NETWORK-CENTRIC WORLD

A Paper Prepared for the
International Association of Technology University Libraries (IATUL) Conference
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by Rob McGee
26 May 1998

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PREFACE

In Transition from the Analog Era to the Digital Age

Our civilization is in transition from the Analog Era, where information has been represented primarily in Analog -- or Print -- form, to the Digital Age, where information is being created and distributed in Digital -- or Electronic -- form. Librarianship is at a turning point -- the advent of the Digital World will impact libraries as no other trend has. Libraries are challenged to organize access both to traditional analog (print-form) information, and to the exploding world of digital information resources available through the Internet/World Wide Web. As libraries poise to offer new and enhanced services for the next century, it is time to replace the basic technologies and to adapt and re-structure library organizations and operations for the "Network-Centric Library World."

RMG's mission is to assist libraries with transition to coherent systems of access to both Analog and Digital Information Resources.

RMG Consultants, Inc. was founded in 1980 by Rob McGee to assist libraries worldwide to plan, procure, and implement computer based systems and services.
RMG's professional staff provide services from two U.S. locations (our Central office in Chicago, and an East Coast office in Bethesda, Maryland) and from the offices of our affiliated company, RMG Information Consultants Pty, Ltd., of Melbourne, which provides professional consulting services to libraries in Australasia and Asia. Rob McGee, President, and Patrick McClintock work from the Chicago office, and Howard Harris works from the Bethesda office. Geoff Payne works from the Melbourne Office.

Since 1993 RMG has emphasized "Information Strategies for Libraries," to position our clients (as well as the library industry) to confront the risks -- and opportunities -- of the Digital Age. The rapid changes in computers and telecommunications have led to library and information industry products and services that provide new approaches and tools for collaborative library systems and services.

RMG is fortunate to have engaged in a series pioneering projects that have allowed us to plan national, state, and regional library networks and systems that take advantage of new technologies and the opportunities they present for library resource-sharing. PART 1:

AT THE TURNING POINT
In Transition from the Analog Era to the Digital Age

Our civilization is in transition from the Analog Era, where information has been represented primarily in Analog -- or Print -- form, to the Digital Age, where information is being created and distributed in Digital -- or Electronic -- form. Librarianship is at a turning point -- the advent of the Digital World will impact libraries as no other trend has. Libraries are challenged to organize access both to traditional analog (print-form) information, and to the exploding world of digital information resources available through the Internet/World Wide Web.

The "Digital Convergence" of computing/communications/consumer electronics/media /entertainment/publishing technologies and industries is producing easy-to-use seamless interfaces, high-bandwidth telecommunications services, affordably priced computing power and storage, and digital content. Altogether, these forces constitute a "sea change" that is recasting the ways in which our culture -- and libraries -- handle information. Libraries are confronted by the risks and opportunities of the Digital Age.

The intensity and pace of the evolving "Consumer-Oriented Information Age" is being driven by the relentless onslaught of technology. In particular, increasingly powerful CPUs are yielding revolutionary gains in computer price/performance, which coupled with significant developments in operating systems, telecommunications, and multimedia technology are enabling long-envisioned "Electronic Futures" to become affordably-positioned consumer products and services.

Giants of the computer and communications industries are watching their traditional strengths being threatened and eroded by the "paradigm shifts" in business and industry that the breakthrough technologies are forcing. Unprecedented alliances have formed by the dozens among companies suddenly thrust into an era where complementary strengths, products, and services in key arenas are required for protection and gain of market share in what has turned rather quickly into a "Consumer-Oriented Information Age."

These cascading technological and business developments among the giants of the "Conglomerated Information Industry" will lead to paradigm shifts in the education and library industries and their somewhat esoteric niches where specialized publishers, booksellers, book jobbers and distributors, and information services organizations provide digital and analog publications to primary and secondary schools, colleges, and universities, and to the libraries, students, teachers, and faculties of these institutions.

The Convergence of Libraries and Education: Opportunities for Library Leadership in Internet Access, Digital Literacy, Digital Pedagogy

As we enter the Digital World much of the information needed by library users that yesterday was available in print form is today being distributed in digital form.

Our librarians, teachers, faculty -- and library users -- need to be re-oriented, re-equipped, re-trained with the tools and techniques of the Digital Age. In the Analog World, librarians and educators used printed books and journals found in library collections. Now, in addition, they must take advantage of digital information resources -- particularly Internet/WWW Resources -- to develop new forms and sources of information for the educational process.

The emergence of digital books and libraries is coming fast. Our libraries' and schools' people, processes, and institutions, must be re-tooled for the Digital Era -- librarians, library users, educators, and students must be trained and equipped to be competent users of information in the digital age.

The basic tools of the Digital Era are Personal Computers and the Internet -- access to networked information is the way of the Digital World. In a school or library the most effective use of personal computers and the Internet requires access to a telecommunications network that connects users to each other, and to digital information resources both within the institution on its network, and worldwide through the Internet.

Communications networks are complicated and expensive undertakings. Some institutions may lack the human resources to track, to understand, and to plan for the latest information technology and may not have the interest, inclination, or energy to make expensive investments in telecommunications networks and personal computers for users. Libraries, even when financially-disadvantaged, are still the primary information resources for their communities and institutions, and must provide universal service to their constituents. Libraries are educational resources for everybody - - the citizens, the business community, school kids, college and university students, faculty. If libraries do not have adequate information infrastructure, then their users simply will be disenfranchised from the Digital World, and will miss opportunities to become "digitally literate." They will miss a chance to become participants in the Digital Library World.

Libraries are essential to their local communities and culture, and are cornerstones of democracy and the educational system In the Analog World, libraries purchased print material, and borrowed books they could not afford to buy. In the Digital World, public libraries must: help us avoid becoming a global society of "information haves "and "information have-nots," by providing universal access to information in all format -- Analog and Digital -- for their readers.

If academic institutions and libraries, and public libraries, do not have adequate information infrastructure, then their graduates and users simply will not become "digitally literate" and they will not be equipped or knowledgeable participants in the Digital World.

Responsible public libraries and academic institutions must help users become digitally literate, and empower them to become full-fledged citizens of the Digital World. How can we do this in libraries where staff do not employ, teach, or provide for users -- or require students to use -- standard information tools and technology?

How can librarians in the Digital Age -- when daily exchange of information on virtually any topic flows through the Internet -- remain credible if they do not have basic opportunities or skills to use Personal Computers and the Internet?

The problem for communities and academic institutions with libraries that do not have adequate information technology is that the longer they wait, the further behind they get, and the more opportunities are lost for their users to enter the Digital Library World!

In the Analog World, librarians have been their communities' information specialists, and they still should be in the Digital World -- they are the people who should help users find both Analog and Digital information Computer and networking people design, implement, and operate computer networks and information systems. Librarians should be responsible for training, assistance, ongoing support of information users: both "Library Users" and "Internet Users."

The special role of academic librarians in the Digital Age is not only to be the campus information specialists in both the Analog and Digital Worlds, and to be responsible for training, assistance, and support of campus information users: library users, Internet users, but also to play leadership roles in the choices of campus user interfaces: Web browsers, HTTP/Z39.50 servers, proprietary interfaces, navigational tools.

Academic librarians should lead in the development and administration of institutional policy for access to digital information resources -- for budgeting, allocation of budgets, and management of funds for institutional access to digital content -- and for choice of content, licensed access, and pay-for-view access. The academic library should be a place on campus that provides an Internet connection available to everybody in the institution, and that provides staff easily available to users for instruction, training, and assistance.

The academic library in the Digital Age should be a place for citizens, students, faculty to go for "hands-on" help and assistance in using the Internet, and finding wanted information -- both Analog and Digital.

In Conclusion

In the transition from the Analog Era to the Digital Age, libraries are at a turning point -- they must assert their roles in the Digital World.

- Libraries must seize opportunities for leadership in the Digital World.
- Digital libraries should be established by librarians
- Libraries and librarians in the Digital World should strive for the same:
  Mission -- Values -- Ethics
  that we have had in the Analog World.
- Public libraries must champion universal access to Digital Information resources
- Academic libraries should lead their institutions to new
  Pedagogical Resources
  Information Tools
  of the Digital Age.

PART 2:

A TECHNOLOGY VISION FOR LIBRARIES IN THE DIGITAL AGE

A Vision for Readers' Access to Information in All Formats

The goal of the Library is to provide readers with the best possible access to needed information in both Analog and Digital formats, and to give taxpayers and other funders the best possible return on investments in libraries and information resources.

The Library's information strategy must be to provide users with coherent access both to traditional print-form books and journals in library collections, as well as to digital information resources available through the statewide network on computers throughout the library system, as well as from information services and sources accessible through the Internet/World Wide Web.

Readers' access to information will be "network-centric" -- readers will be connected electronically to catalogs and indexes of information in libraries' print collections and electronic databases, and to full-text, abstract, and index databases available from commercial providers on a subscription and pay-for-view basis from computers on the Internet/WWW.

The Library's vision is to deliver to users ready access to the rapidly emerging digital library world of the Internet/World Wide Web. This comes at a time when the fundamental role of free public libraries in our society is challenged by the emergence of electronic information resources that must be paid for at prices not affordable by all. The tradition of free public libraries is at risk at this moment in the advent of the Digital Age, as the trend of providing electronic information on a pay-for-view and subscription basis is clearly growing.

Academic libraries can neither afford to buy all print books and journals of interest, nor subscribe to all wanted electronic resources. In the Analog Era interlibrary lending and borrowing was the compensating mechanism. In the Digital World academic libraries must seek ways to share electronic resources on an as-needed basis.

For-pay access to digital information resources on a transaction basis will address this in part. However, the needed societal solution will be to change the paradigm of scholarly publication in order to take advantage in the Digital World of the inherent efficiencies of digital publishing and network distribution.

As our society makes the transition to the Digital Age, where information is created and distributed in digital form, our libraries and library users must be oriented to and equipped with the tools and techniques of the Digital Era. We must re-tool our librarians and users to be competent users of digital information. We must provide an adequate information infrastructure to prevent our citizens from becoming disenfranchised from the Digital World and missing opportunities to become "digitally literate."

Implementation of new technologies will allow libraries to provide more and better service to patrons, in part due to new or improved access to information resources, that should be accompanied by re-engineering library organizations' structure, processes, and workflow to allow re-allocation of human resources to service-related tasks.

The Library Automation Industry in 1998

Today's library technology market is highly dynamic, with significant enhancements being rolled out at an ever- increasing pace, driven by improvements in base computing and telecommunications technologies and by extremely competitive forces in an industry that can no longer support the same historic array of vendors and products. Graphical user interfaces, transparent gateway products, access to local, regional, and international networks and the Internet/World Wide Web, and the slow but inevitable move toward client/server based architectures, object-oriented software development, and fourth generation relational database management tools and products are all factors responsible for this new climate.

As libraries poise to offer new and enhanced services for the next century, it is time to replace the basic technologies and to adapt and re-structure library organizations and operations for the "Network-Centric Library World." The emergence of Global, National, and Local Information Infrastructure (GII, NII, LII -- see Part 3) and the cascading developments of the "Digital Convergence" of the computer/communications/consumer electronics/entertainment industries, have introduced a new era for libraries. RMG believes that the following considerations should become the goals and objectives of information strategies for libraries.

GOALS AND OBJECTIVES OF LIBRARY INFORMATION STRATEGIES IN THE DIGITAL AGE

- 4 GOALS OF A LIBRARY INFORMATION STRATEGY
    1. EASY-TO-USE PUBLIC ACCESS SYSTEMS TO BOTH ANALOG AND DIGITAL INFORMATION RESOURCES
    2. EASIER AND COMPREHENSIVE ACCESS TO ANALOG (PRINT) RESOURCES
    3. ENHANCED AND AFFORDABLE ACCESS TO DIGITAL INFORMATION RESOURCES
    4. HIGH-BANDWIDTH CONNECTION TO INTERNET
- OBJECTIVES OF A LIBRARY INFORMATION STRATEGY
    - BECOME "NETWORK-CENTRIC"
    - ANTICIPATE THE ADVENT OF DIGITAL LIBRARIES
    - LEVERAGE TRADITIONAL LIBRARY ANALOG INFORMATION RESOURCES
    - RE-ENGINEER LIBRARIES FOR THE DIGITAL AGE
    - LEVERAGE HUMAN RESOURCES

Implications of Interactive TV for Home Access to the Internet: "Couch Potato Interfaces" that are Easier to use than Automated Library Systems

The advent of interactive television is now focused on access to the Internet/WWW, and is leading to development of interfaces for home users that to be workable must be simple -- "Couch Potato Interfaces" will be very user friendly! It is just a matter of time before information services will be delivered into the home, including access to some of the same electronic databases that heretofore have been available to library users through rather difficult "character" interfaces.

The prospect that libraries must face is the provision by telephone, television, and cable television companies -- plus the up and coming new wireless players -- of digital information services to users in their homes and workplaces, through interfaces that are easier to use than those currently provided by automated library systems and university networks.

The challenge for libraries is to provide improved access and interfaces to digital information resources. which means that libraries should implement:

- Graphical User Interfaces
- That operate on personal computers -- no more dumb terminals!
- That attach to libraries' Wide-Area Networks (WANs) or Local Area Networks (LANs),

in order to provide a greatly expanded set of capabilities for access to Analog and Digital information resources.

Feasible Goals for Library Technology: Graphical User Interfaces

The provision by libraries of easy-to-use Public Access Systems to information in both analog and digital formats should be a goal for new systems and services.

With today's technology, this translates to mean that access to Libraries' Online Public Access Catalogs as well as to electronic databases should be conducted through easy-to-use graphical interfaces (graphical Web browsers -- e.g., Netscape's Navigator and Communicator, Microsoft's Explorer are today's offerings) that are provided by special software operating on personal computers.

Personal computers with GUIs should be deployed throughout library premises, replacing the "dumb" terminals now used with many automated library systems. These graphical interfaces will be provided by "Client" software packages (preferably, graphical browsers; but also proprietary Windows-based clients) that are now commonly available either as commercial products.

These interfaces should also be available to users outside the library, connected by networks (LANs or WANs) or dial- in access to the library's automated system. Capabilities to download graphical software packages to users' personal computers, on-demand, should be a goal for provision of easy-to-use and in some cases specialized interfaces. It may be expected that different graphical clients will be required for different activities: e.g., searching the Library's Online Catalog and/or the Internet through graphical browsers, versus using a proprietary Windows client for processing applications such as acquisitions and cataloging. More about the requirements for suites of interfaces to be supported by the library will become known as specific systems, products, and services are selected through procurement processes.

Feasible Goals for Library Technology: Access to Digital Information Resources

Access to electronic databases and other digital information resources, both locally (e.g., on-campus and off-campus, within or without the library's parent institution) including library's Online Catalogs, commercial databases, and other resources available nationally and worldwide through Internet should be a major goal of new systems and services for libraries. The availability of electronic databases and books is already a fact of life on Internet. More digital books, and the emergence of commercially-provided libraries digital libraries will come.

The new Library and Information services should be made available through easy-to-use popular interfaces to readers both within the Library as well as those connected to the library through various telecommunications systems and networks.

Feasible Goals for Library Technology: Connection to the Internet

Public access to Internet through easy-to-use graphical Web browsers should be available to readers within the library. Increasingly, the world's digital information resources are becoming available over networks (in contrast to CD-ROM), including the Internet.

A Vision for Public Access to Information in All Formats -- from the Library's Point of View

The Library's information strategy would be to provide users of the library with coherent access both to traditional print-form (analog) books and journals in Library collections, as well as to digital information resources available through the Library's wide-area network on computers throughout The Library system, as well as from information services and sources accessible through the Internet/World Wide Web. Readers' access to information will be "network-centric" -- readers will be connected electronically to catalogs and indexes of information in the Library's print collections and electronic databases, and to full-text, abstract, and index databases available from commercial providers on a subscription and pay-for-view basis from computers on the Internet/WWW.

The goal of information technology in Library facilities shall be to provide readers with the best possible access to needed information in both print and electronic formats, and to give taxpayers and other funders the best possible return on the Library's investments in Analog and Digital Information Resources.

The Library's vision is to deliver to readers at workstations on library premises ready access to the rapidly emerging Digital Library World of the Internet/World Wide Web. This comes at a time when the fundamental role of free public libraries in our society is challenged by the emergence of electronic information resources that must be paid for at prices not affordable by all.

The tradition of free public libraries is at risk at this precipitous moment in the advent of the Digital Age, as the trend of providing electronic information on a pay-for-view and subscription basis is clearly growing.

Table 2-1 lists possible technologies and services for consideration by libraries.

TABLE 2-1

KEY TECHNOLOGIES AND SERVICES TO BE CONSIDERED FOR LIBRARIES

- Library Intranet
- Network PCs and Simply Interactive PCs (SIPCs)
- Managed LAN and WANs
- Managed PCs
- Applet Servers
- Integrated Library System Server
- HTTP/Z39.50 Server to Support 300 Users
- Intranet Server
- Internet Server
- Network CD-ROM Server for Hosting CD-ROM Databases
- Network Database Server to Support Many Simultaneous Provide Data Storage for Electronic Text Resources
- Administrative Applications Server
- Network Media Server
- Multimedia Workstations
- Desktop Video Conferencing
- Video Conferencing Theater
- Video Conferencing Production Studio and Equipment
- Satellite Download and Uplink
- Assistive Devices for Physically-Challenged Users
- Patron Self-Charge Workstations
- Computer Lab for Training and Digital Literacy Programs
- Audio Visual Production Facilities
- Audio Visual and Film Theater
- Job/Career Center

  - Kiosks
  - Compact Book Storage
  - Smart Cards for Staff and Users
  - Security and Monitoring Systems
  - Outsourcing of Selection and Technical Processing of Library Materials

A Vision --- from the User's Point of View -- for Use of Information Technology in the Library

- Throughout the building I will be able to get help in using the Library from staff in red kimonos who are available in all public services areas, as well as through the use of computer workstations and kiosks that video conference me with staff at their service stations who will provide me with Video Conference Help Services.
- Upon my first use of the renovated Library I will be issued a "Smart ID Card" (sponsored by local businesses) that gives me:
  Physical access to restricted areas within the building
  Electronic access to restricted, or "for-pay," digital information resources.
- I will be assigned a "PIN -- a Personal Identification Number" that will allow me to electronically access designated information resources for which the Library must specifically authorize me.
- There will be computer workstations throughout the Library that will connect me to the Library's Help Services, and to electronic catalogs and indexes of the Library's book and journals and to the library's electronic information resources.

  These workstations will be installed with Web Browsers and other interfaces with which I am familiar.

  If I have difficulty using the workstation, I will be able to click on a button that connects me with the Library's Video Conference Help Services.
- I will be able to save electronic files that the Library will store for me in my Private Electronic File that only I can access, through the use of my Smart ID Card and my PIN (Personal Identification Number). When my Private Electronic file fills up, I will be asked to remove information before I can store more.

  I will be able to email information from my Private Electronic File to my own Internet address that I have provided for myself.
- I may bring my personal computer to the Library and "plug-in" to the Library network, and download wanted information that I can take away with me, or email to myself at my own Internet address.
- I can also dial-in from my home or office computer to the Library's network, and through the use of my PIN, gain access to the Library's electronic resources, and request books for pick-up by me there, or delivery to a branch library convenient to me.
- I will be able to print-out certain types of electronic information in hard copy that I may take away with me. I understand that I may print out some electronic information free-of-charge, but that I may have to pay for other print-outs.
- I will be able to make photocopies of the Library's print resources, for which I will have to pay.
- I will be able to "charge" photocopying and print-outs to my Library account that only I can access through my Smart ID Card and PIN.
- I understand that while the Library has subscribed to many electronic information resources that I can use free of charge, I can also access through the Library's network hundreds of others on the Internet/World Wide Web, some of which are free, and some of which are available to me only on a "for-pay" basis.

  I will be able to use some of these "for-pay" resources by paying for them from my Library Account, to which I can make charges using my Smart ID Card and PIN.
- I can telephone or dial-into the Library network to get a calendar of upcoming events and to make reservations for lectures, programs, distance learning classes, and video conferences. I understand some of these events are free of charge, and that I may have to pay for others.
- I can also make suggestions and arrangements with the Library for it to participate in video

conferences and distance learning programs that I may attend without charge, or to allow me to use their facilities for these types of services on a for-pay basis.

PART 3:

THE NETWORK-CENTRIC DIGITAL LIBRARY WORLD

This section illustrates the "Network-Centric" nature of libraries in the Digital Age.
Figures 3-1 and 3-2 show that, for the present, "getting onto the Internet" is the way for libraries to gain access to their local Community Information Infrastructure (CII), their National Information Infrastructure (NII), and the Global Information Infrastructure (GII).

As global, national, and regional Telecommunications, Television, and Cable Television companies continue to ally and merge, other avenues for connection to the NII will emerge.

Figure 3-1 outlines a Global Information Infrastructure "cloud" that connects to National Information Infrastructures, or "clouds". For a community to connect to the Internet, and through it to the NII and GII, it needs to have a "Local Community Information Infrastructure".

Figure 3-2 illustrates the type of "Emerging Local Digital Information Environment" that is coming rapidly to many areas of the world, where schools, libraries, colleges, universities, and individuals will be participants in the Local and National Information Infrastructures. This figure calls attention to the unfolding future in which individuals in the home and workplace will become the targets of information-providers. ***The same people who are today's customers of libraries -- especially the users of Analog Information -- will become tomorrow's targets for everyone selling Digital Information.***

The simplest "Local Information Infrastructure" for access to the Internet would be a PC with a modem that could dial-in to an Internet provider.

Figures 3-3 and 3-6 illustrate the needed "Library Information Infrastructure" that includes a Local Area Network (LAN), PCs, and a high-bandwidth connection to the Internet, possibly through a Wide-Area Network (WAN). Universities worldwide need to take immediate steps to provide sufficient LAN/WAN bandwidth. The bandwidth goal as of 1998 for large campus networks should be 1 GB/sec.

Figure 3-4 and 3-5 show how commercially-provided technologies can be networked through LANs/WANs/Internet/WWW to provide to new levels of "Library Resource-Sharing in a Network-Centric World."

Figure 3-6 outlines a four-step sequence by which Libraries can implement the necessary Information Infrastructure and plug-in to the "Network-Centric Digital Library World."

Figure 3-1
Information structure

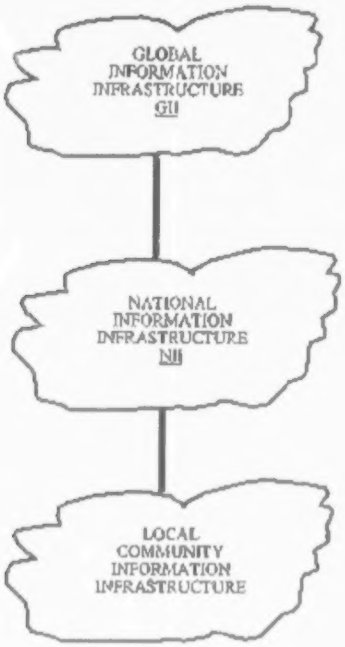

Figure 3-2
Emerging community digital information environment

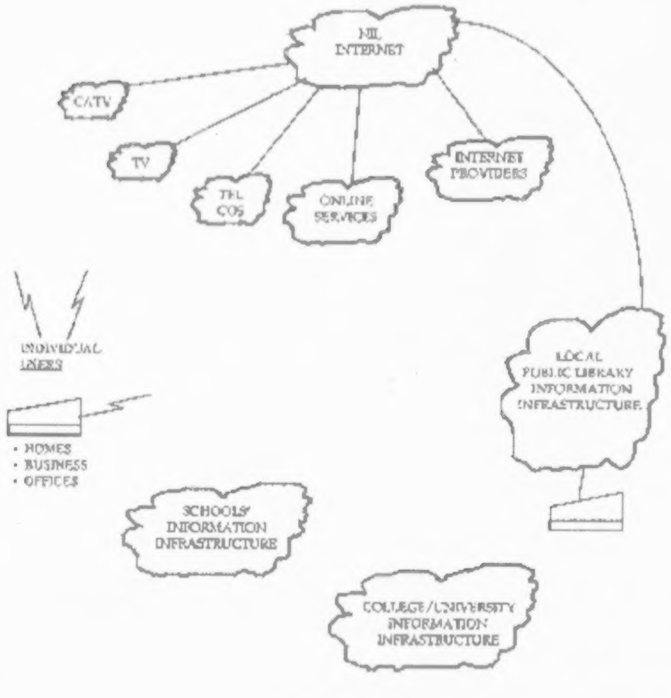

Figure 3-3
Estimated bandwidth requirements for a library and education network

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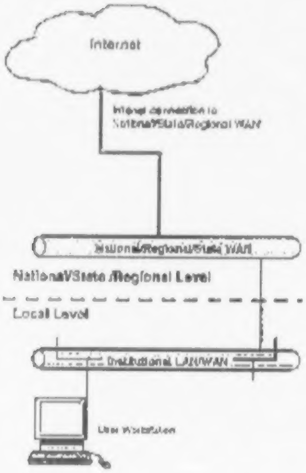
Internet
Internet connection to National/State/Regional WAN
National/Regional/State WAN
National/State /Regional Level
Local Level
Institutional LAN/WAN
User Workstation

Text	Images	Multimedia
	- -	
8 Mb/sec	20 Mb/sec	100 Mb/sec
10-100 Mb/sec	100 Mb/sec	1 Gb/sec
10-100 Mb/sec	100 Mb/sec	1 Gb/sec
1 Kb/sec	S 1.5 Mb/sec	1.5 Mb/sec

RMG Guidelines for Average Library Bandwidth Requirement:

(a) Average for ASCII Terminals: ^{3}2 kbps

(b) Average for Personal Computers: ^{3}12 kbps

Figure 3-4
Statewide/regional library network architecture

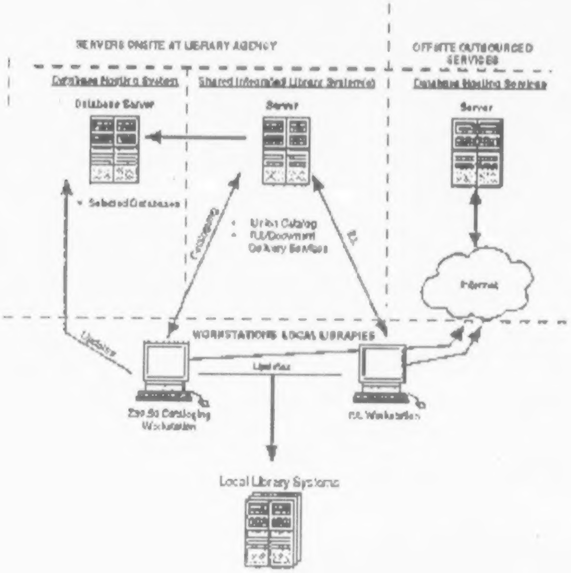
SERVERS ONSITE AT LIBRARY AGENCY
OFFSITE OUTSOURCED SERVICES
Database Hosting System
Shared Integrated Library System(s)
Database Hosting Services
Database Server
Server
Server
Selected Databases
Union Catalog
ILL/Document Delivery Services
Cataloging
ILL
Internet
Updates
WORKSTATIONS LOCAL LIBRARIES
Updates
Z39.50 Cataloging Workstation
ILL Workstation
Local Library Systems

Figure 3-5
Standards based library network

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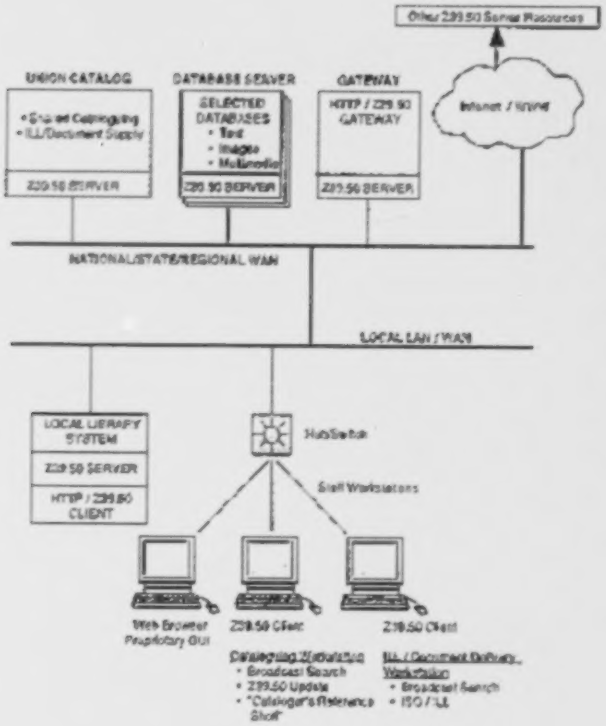
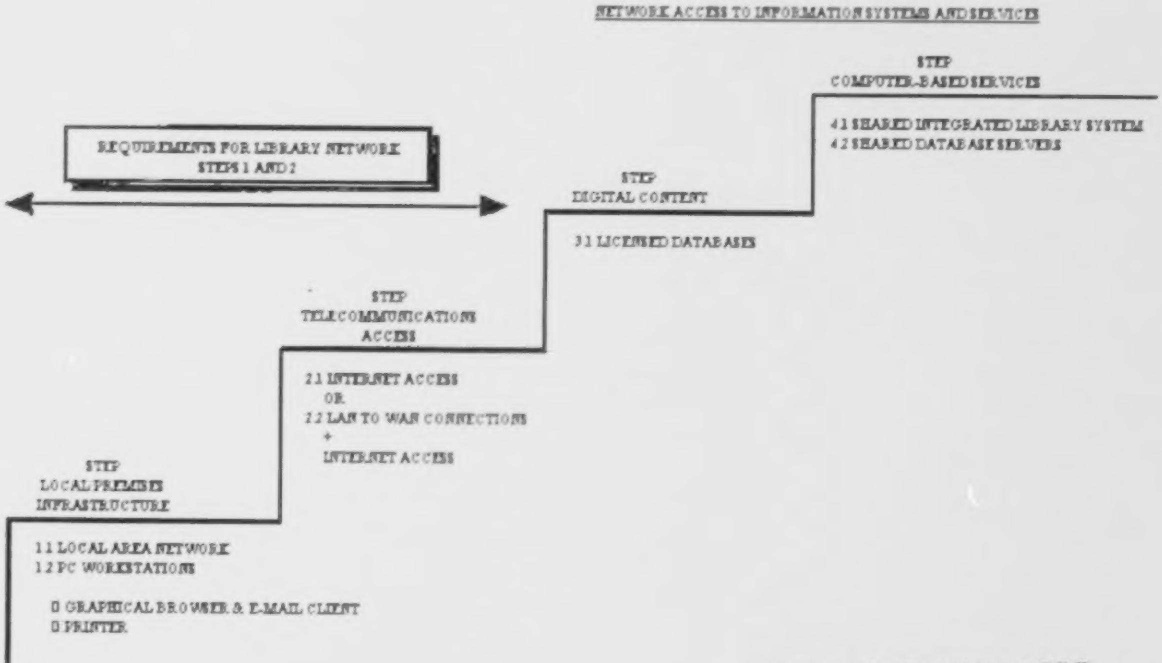


Figure 3-6
Four-step implementation strategy



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PART 4:

LIBRARY RESOURCE-SHARING IN THE NETWORK-CENTRIC WORLD

As libraries poise to offer new and enhanced services for the next century, they should review and update their mission statements, provide appropriate Local Information Infrastructure for themselves, and be willing to adapt and re-structure their organizations and operations in order to become full participants in the "Network-Centric Digital Library World." To do this will position them to engage in an array of new and renewed Library Resource-Sharing opportunities. Table 4-1 is offered as a framework for considering "Possibilities for Library Resource-Sharing in the Network-Centric Digital World."

Today's library organizational and staffing patterns are based upon models developed to meet the needs of library services in the Analog Era. It is time for libraries to assert new roles for themselves in the Digital Age, and to adapt, re-invent, and re-cast themselves in ways that carry forward and continue their mission, values, and ethics as society's information providers.

In the Analog Era libraries and commercial book sellers complemented one another. In the Digital Age it seems but a matter of time until libraries will find themselves in competition or partnership -- or both -- with providers of digital information who will target every home, school, and office -- and libraries as well -- through telecommunications delivery channels. This is an excellent time for libraries to become entrepreneurial, in order to be successful agents of correct missions, values, and ethics in the Information Age. The considerations outlines in Table 4-1 are meant to stimulate thought and discussion of these possibilities.

TABLE 4-1
POSSIBILITIES FOR LIBRARY RESOURCE-SHARING IN THE NETWORK-CENTRIC WORLD

1. Sharing of Physical Facilities
   - Storage of
     - Little-used materials
     - Distributed collections accessible through Virtual Union Catalogs
   - Host Site for Computer Operations
   - Host Site for Network Operations,
     - To manage LANs/WANs/PCs
2. People and Expertise
   - Planning
   - Management
   - Operations
   - Financing
   - Skill sets: e.g.,
     - Internet-based Reference services
     - Information Literacy
3. Telecommunications Networks and Services
   - WANs
   - WAN Standards, Management, and Operations
   - LAN Standards, Management, and Operations
   - Internet Access and Services:
     - Internet 2
     - Next Generation Internet
4. Computer System Hardware, Software, Subsystems, Standards
   - Shared Special-Purpose Systems: e.g.,
     - Shared CJK System (or other special database- related systems)
     - Union Database Superhost, with Distributed Local Library System Nodes
     - Virtual Union Catalogs
     - Third-Party ILL/Document Delivery Systems/Services
     - HTTP/Z39.50 Gateway Server

        - Database Server
        - Digital Library Servers
        - Interlibrary Loan/Document Delivery Systems and Services
    - Declaration of PC Standards
    - Declaration of LAN Standards
    - Declaration of File Server Standards
    - Remote Management of PCs, LANs, File Servers
5. Networked Information Services
    - Consortium (Group) contracts for access to electronic databases
    - Virtual Union Catalogs
    - Digital Libraries
    - Interlibrary Loan/Document Delivery Systems and Services
    - Outsourced Automated Library Systems
    - Outsourced Selection, Acquisitions, Cataloging, and Preparation (Technical) Services
6. Data and Data Conversion Projects/Cataloging Services: e.g.,
    - Shared cataloging in designated subject areas
    - RECON Projects
    - Imaging Projects
    - Electronic Course-Reserve Imaging Projects
7. Library Materials
    - Interlibrary Loan
    - Collection Development
8. Persuasion of Permission-Givers
    - Boards
    - Member Libraries
9. Other Processes for Specific Goals
    - Joint Procurements
    - Fund-Raising
10. One-Time and Ongoing Costs

Back to contents

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IATUL

PEOPLE IN A TECHNOLOGY DRIVEN FUTURE: On The Social Relations of New Information Technologies

Ojelanki K. Ngwenyama

Keynote Address
To the 1998 IATUL Conference on:
Millenial Megatrends: Gateways to the 21st Century
University of Pretoria
June 1, 1998, 10:30

"It was the best of times, it was the worst of times,"
Charles Dickens.

Thank you Mr. Chairman, for your kind introduction. Mr. Vice Chancellor, Distinguished guests, Members of the faculty.

First I want to confess that I did not select the title for this lecture. The title was selected and I was informed about it by fax some ten days ago as I was preparing to travel to Denmark to work with some colleagues at the Computer Science Department, Aalborg University.

I must say, however, that whoever selected it did a brilliant job. It has engaged me ever since I got the fax.

Distinguished audience I would like to suggest to you that the title: People in a technology driven future raises a fundamental question; what will be the social relations of information technology in future years. A question that suggests no easy answers. So fundamental is this question that I decided to make it the subtext of my lecture.

Distinguished audience, questions of the future have baffled humans for millennia. As a scientist I have no crystal balls or physic media through which I can discern or divine the future. Until now, the basic strategy that scientists have used to look into future has been informed speculation. In fact all scientific theories are speculations until corroborated or rejected.

But on what do we base our speculations? The answer is historic fact.

With this basic principle of scientific theorizing in mind I would like you to follow me as I try to speculate about people in a technology driven future. As I said earlier, our title raises the fundamental question: What are the social relations of information technology likely to be in the future.

Before we enter this discussion I would like to declare my philosophical position. I am a critical theorist who does not separate theory from practice. My primary interest as a computer and information scientist is in improving the human condition. I am a warrior for social change. This is vantage point from which I engage the world and my profession.

I submit to you my central thesis in a Dickensian phrase:

> *A technology driven future ...*
> *may be the best of times, or the worst of times.*

I repeat for emphasis:

> *It may be the best of times, it may be the worst of times.*

In order to build a case for my central thesis I want to briefly take you through three examples of the recent history of technology.

Let us start with start with the technology of transportation. Particularly the large ocean going vessels, those developed during the fourteenth century, the kind the Portuguese were known for.

These vessels revolutionized transportation. They reduced the perception of distance and the size of the world. They brought great wealth and power to Western European nations and misery to the peoples of the so-called 'new world' and 'dark continent'. And most importantly they set in motion social relations which has resulted into an exploitative world system of richer and poorer nations that we still experience today.

While on the one hand many benefited from the coming of this new technology many millions have suffered. The same ships that moved goods and supplies for international trade and commerce, moved people to colonize and armies to subdue parts of the world. And to make the point of goods clearer, some people were moved as goods for commerce.

Today there is no part of the world that remains untouched by the dualistic legacy of those fourteenth century sailing ships. Indeed much of the difficulties that South Africa faces today have been set in motion by those very sailing ships.

But let us must move on from the ships. A second and important technology that came upon the scene in this period is the printing press. When Gutenberg unleashed the printing press nearly 99% of the people of Europe were illiterate. Reading and writing were the purview of the Catholic Church elite, royal families and a few government administrators. Even though the coming of the printing press did not immediately improve literacy it spawned an information revolution and gave rise to that special class of information workers known today as the 'news media.'

Handbills of printed pictures informed rural peoples about the happenings in the towns and brought people closer together. Later, the printing and distribution of religious literature lead to the various reformations by Martin Luther and others, and the beginning of the decline of Catholic Church's preeminent position in social affairs. Within few hundred years Europe was almost completely transformed.

But there is also a darker side of this printing technology as well, that is, propaganda and disinformation. The strategy of using printed material to thwart the will the people started almost the same time as the reformation. While Martin Luther and others were fighting to free people from the iron grip of the church elite, they fought back with disinformation and propaganda.

The war was for control over the minds of the masses and the maintenance of the status quo. While print technology has given us enormous blessings of literacy, cheap education (the distance university, UNISA, University of London), easy access to all forms of knowledge, handbills that help us fight disease in remote regions, it has also given us hate literature, propaganda and disinformation.

A third technology of importance here is nuclear energy. Here we see the same pattern of the legacy of good and evil. In this century we were able to make significant advances in the production of cheap nuclear energy. We started on this road with a blast. Bombing Hiroshima and Nagasaki killing tens of thousands and racing foolishly into oblivion in the ensuing East-West arms race. And as we sit here today there is a chance that another nuclear arms race might emerge in Asia.

Distinguished audience, as you listen to me, you may be thinking what do all these examples have to do with people in a technology driven future? From these three brief examples it is clear that the technologies were not the problem. It was who controlled the technologies and, how and for what purposes they were used. In other words the social relations of the development and use of the technologies.

To restate our question: What will be the social relations of information technology in the future? Then simple answer is; it depends on who cultivates and controls the technology infrastructure of the future. This I think is the essential lesson of history. With these historical facts as the backdrop, let us now look at some troubling examples of the social relations new information technologies that is emerging global scale.

Let us start with the international communication infrastructure, the telephone. The global telephone system has facilitated communication between individuals, businesses and non-profit organizations. Like the printing press it's predecessor, it has brought together tens of millions of people.

So important is the telephone system that most of us who use it regularly cannot think of a life without it. Indeed had it not been for this media I perhaps would not have been your keynote speaker today. But just what are the social relations of this technology. Some of you may know that less that a third of the world's population have access to a telephone. Yes less than a third of the world's population.

You might be surprised to know that telephone service in most American cities by-passes the homes of some 36% of the people who live there. These are the so-called inner city poor. Walk through any of these areas and you can see banks of telephones outside local stores. These are the points of access for the poor. And this is in spite of national regulations that were intended to make telephone service a social good. Do you know that less than 10% of the world's population have access to any kind of computer?

Distinguished audience it is a small elite of the world who have access to and knowledge of how to use these technologies. It is this elite class of people, government policy makers, business executives and information scientists that are talking about a technology driven future. Most of the world's population have no voice in the discussion. The technology driven future is defined largely by distributed organizations and work, and electronic commerce. A key observation however, is that modern telephone and transportation systems, although value neutral and social goods, are contributing to the demise of urban life and precipitating the emergence of exploitative international labour practices.

Let me give a few illustrations: Before the telephone and cheap and effective transportation, people needed to be in proximity for commerce and social interaction. The center of activity in cities all over the world were the markets, the place where goods, services, stocks and futures contracts were traded.

Distinguished audience I would like to suggest to you that all the major cities of the world, London, New York, Paris, Berlin, Toronto, Johannesburg, Shanghai, that we all enjoy visiting had their genesis in the need for human proximity.

First cheap transportation reduced the need to live in proximity, and led to many American cities becoming temporary daytime housing for business activities, and deserted caverns at night. The second assault upon urban life was cheap telecommunications.

With cheap and instantaneous communication people no longer need to be in proximity, so there is no need of central meeting places. A poignant example of this is the demise of the London Stock Exchange. The LSE now has no physical location where people are in face to face contact with each other. It now exists as a virtual market place held together by information technologies.

A second example of the impact of teleworking is the international distribution of labour to lower wage markets. While this practice improves the profitability of many companies it can also have diverse effects of the cities that the work is moving from and workers who are recruited to work for foreign business owners. Here I can offer two examples.

I first started to critically reflect on the implications of teleworking in June 1988. I was Sciphol Airport in The Netherlands awaiting a flight to Hong Kong on my way to China for a summer teaching engagement. There I was approached by a young Chinese man and offered a deal. And I quote: "You are going to Hong Kong, right?" Yes! I responded. He then said; "Do want a good quality hand made suit when you arrive at the airport for less than half you would pay in Amsterdam?"

I thought it was some type of joke, but as I inquired further he opened his brief case and showed me samples of top quality English wool. To get to the point of the story. This young Chinese man operated a business in which he would take the measurements of a client transmit them to the factory in Hong Kong, where they would make the suit while the client is in transit. At the Hong Kong airport some one would stand with placard with the client's name on it. The placard holder would then take client into a dressing room to check the fit, or make arrangements to do the fitting and finalize the transaction at the client's hotel.

Witnessing this type of business transaction got me thinking about telecommunications and the international distribution of labor, a subject I have since investigated in some detail. But we must move on to another example.

It is quite common today for many people in the US, Canada and other countries to engage in Home TV shopping. That is to look at various television channels dedicated to shopping, such as the Home Shopping Network (HSN). What many of these people do not know is how these transactions are executed and managed. Let me illustrate; The viewer calls the toll free number displayed on the television.

The order entry clerk answering the call may be located in Barbados, Jamaica, Bahamas or another cheap labour market in the Caribbean Islands. The order is entered into a computer system that automatically dispatches it to the warehouse in Mexico, and the credit card is charged. The warehouse workers in Mexico pack the order and load it onto the truck that leaves the next morning for the closest UPS or Federal Express depot across the border.

The Home Shopping Network owns no television networks, no factories or warehouses, employs no telephone clerks. It simple rents production space and television time, and, serves as a intermediary, an electronic marketing presence for some set of 'virtual companies.'

The 'virtual company' owns no factories or warehouses. It may simply be a toll free telephone number, an electronic bank account, and a mailbox in the Caiman Islands. The Manufacture of the products for sale may also be another virtual company that contracts out production to contractors operating in low wage labour markets. And still a third company is involved. The distribution company responsible for stock, packing and shipping the products. So what are some of the implications of these uses of technology to span time and geographic barriers?

For a start, no aspect of the business transaction described above requires social proximity. There is no store to walk into. Order entry, manufacturing, warehousing and shipping moves away from the location and proximity of the sale. In short the jobs go where ever labour is cheap, labour regulations are weak and workers can be easily exploited.

The jargon for these structural changes in business organization is dis-intermediation. The consequences however, have less sophisticated names like unemployment. Unemployment for a class of workers who live in the cities where these transactions originate and substandard wages for foreign workers with low perceived power.

The misery of low status workers in developing countries on the periphery of the centers of commerce and power is well documented. University graduates in Barbados and Jamaica who cannot find skilled jobs work 10 hours a day answering phones in electronic sweat shops for 400 US a month.

The Taiwanese engineer slaves 14 hours a day to design and build new computers for the ever increasing demand for new and more powerful computers set by Wall Street executives and the information elite. The story of exploitation of Asian workers making Nikes is well known.

And the quote a popular song, the beat goes on. More recent developments in teleworking or globally networked production are, on-demand manufacturing of computer hardware, fashion wear and other products, software development, data entry, and so on.

But while these are visible and easily recognized examples of some of the implications of social relations of the new information technologies, what about the invisible implications. For example, what about those silent masses of people who are locked out of the electronic labour pool and electronic commerce.

Locked out because they have neither access to computers and telecommunications infrastructures nor the skills to work with these technologies. If we are thinking about a future driven by information technology, we need to ask ourselves: Whose future are we thinking about? What future are we envisioning?

Make no mistake, there is inequality in access to technology on a massive scale. Please remember that less than 33% of the world's population have simple telephone service. So what do we mean by a technology driven future?

One in which some people and some countries are effectively locked out from participation?

One in which some peoples and some countries serve as low cost labour pools for exploitation by the information technology elite countries?

One in which few benefit from the promise of technology and the rest are simply forgotten?

Such a future is very possible and likely if we fail to act. For while the cost of technology is dropping in rich countries, the earning power of people in poorer countries and the value of currencies they use are rapidly falling. Just eight months ago the price of 500US computer in Jakarta was 600,000 Rupiah, today it is about 9,000,000 Rupiah. Education in poorer countries is also falling behind.

The vast majority of the world's population has never touched a computer or telephone. As a critical theorist I ask the question again: What do we mean by a technology driven future? Whose future are we talking about?

Distinguished audience I would like to suggest to you that those who do not have access to the emerging global information technology infrastructure shall not have a technology driven future.

Theirs is to be a future of marginalization on the fringes of the post modern world order. And such a faith will not be limited to people of poor countries. We can envision a similar faith for the urban poor in major cities around the world.

That is lot of most people in the technology driven future, unless, we, the information technology elite, bring about a different future.

The responsibility then, is ours to define a technology driven world in which the benefits are maximized and the perils minimized. This is no easy task. It will require many of us to be interventionists, something which we are told by scientific orthodoxy is bad.

Those who want to exploit these technologies for their singular benefit want us to believe that we should simply produce value neutral technology and let the market dictate its uses. That is absolute nonsense. The market does not do a good job of generating social goods.

It is not a place of social responsibility, it is a place of self interest and profit motive. If we had let the market allocate education many of us would not have been educated.

Just as public schools, public universities, public hospitals, public transportation, public libraries and public museums are essential the health and wellbeing of a nation in the present, so too is a public information technology infrastructure.

A free and open global internet infrastructure is necessary for future social and economic development of the less develop countries. In the absence of such infrastructure the majority of the world's population will be locked out of social and economic interaction with the richer countries.

Distinguished audience I would also like to add that the market is not going to educate people about technology who cannot afford to by a computer and acquire telephone service. It is not going to provide access to the poor and indigent. Those are our responsibilities.

We must reach out to the technology illiterate and educate them about this new technology that will play such an important role in their lives whether the have access or not.

In the Department of Informatics at this university there is a fine example of such a vital activity, the UNI School. It educate thousands of ordinary South Africans ever year, most of them have never touched a computer before coming here.

We must also lobby the governments to allocate scarce resources to build the necessary infrastructure and enact legislation to ensure that as many as possible have a place in this technology driven future that we are talking about.

Distinguished audience, again I put to you my central thesis:

> *The technology driven future may be the best of times, or the worst of times.*

It all depends upon us, the business magnates, the national governments, and that special class of technology elite, the computer, communication and information scientists living near the end of this century. We must be brave enough to be critical of our developments and speak out on how they are to be used.

Distinguished audience,
I thank you.

Back to contents

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USING THE INTERNET TO SUPPORT LIFELONG LEARNING: THE ROLE OF THE LIBRARIAN

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1. Introduction

The role of the Internet to support teaching and learning is now being investigated by a number of academic institutions. Despite some reservations about the quality of some of the content and the fact that major issues surrounding copyright and security of data are still a significant factor in inhibiting the full potential of the Internet , most commentators would concur with the view that there is now a vast repository of solid and useful information available for exploitation. Because of the inherently flexible nature of the Internet as a platform for preparing and delivering teaching resources it seemed logical to assume that its use could be extended relatively easily to non campus based delivery and it could thus be seen as support for 'distance' or 'open' learning.

Much of the current literature in this area concentrates on the way in which academics can use the new technology to develop innovative methods of teaching and on how teaching materials can be efficiently prepared and presented in electronic format. There are a number of significant projects which have looked in detail at the development of academic staff skills and attitudes in relation to using new media for delivery and for developing resource based learning methods. [1] Less attention has been paid to the role of non-academic support for such developments and, as libraries are one of the key players in learning support (arguably the principal player) it is argued that it is imperative that we look carefully at the manner in which the new technology is changing the way in which librarians perceive and perform their function.

2. The new role for the information professional

In a sense it is unnecessary to lecture librarians on the importance of embracing information technology. Information workers have in the past been quick to identify the way in which new technology can be used to enhance the services which they have traditionally provided and the library school curriculum has reflected this [2]. However, it could be argued that until very recently the role of this technology has essentially been as an enabling factor in permitting libraries and information services to perform their traditional function of controlling the organisation of and access to bibliographic data. Thus it was not altogether surprising to find in a recent survey of Scottish librarians [3] that the attitude of librarians to the Internet and their perception of its value was restricted largely to support for traditional services - in particular as a tool for the reference librarian.

Accepting the point made by Wilson [4] that anything specific which we say about the role of the librarian in the 21st century is almost bound to be wrong because of a lack of certain knowledge of the life cycle of the profession and its usual growth curve, it is important nonetheless to try to examine significant trends. In terms of academic librarianship there are two critical developments which must be taken into account when assessing the role of the librarian in a global networked environment and these are that:

1. there is an increasing knowledge of and use of new technology by users of library services and this provides them with rapid access to information from an increasingly rich variety of networked information resources
2. there have and continue to be changes in the philosophy of teaching and learning and of the environment in which teaching takes place, and these changes need to be reflected in the manner in which libraries respond in their role of providing training in information skills

The first of these developments may be rather crudely seen to give rise to the question of why librarians are needed at all. We have progressed through a series of developmental stages in information technology which have seen the 'ownership' of the technology progressively being the province of scientists and engineers then of document creators and custodians to the point at which we are now where the technology has passed into general ownership. If information is going to be available on-line and accessible from the desktop for all then why do we need to have librarians? Although we have not yet conducted rigorous surveys to provide an accurate measure of the extent to which students are using the Internet to gather information for their academic studies, most teaching staff would concur that, from the evidence of informal feedback from students and from the frequency in which web addresses are cited in coursework bibliographies, the Internet is now established as significant learning support tool [5]. In such an environment it is vital to the credibility of the profession that the librarian assumes a role which is "less of a warehouse manager and more of a reference consultant." [6] Myburgh [7] and Walsh [8] observe some of the changes which are already being experienced by academics and note the manner in which this will demand a new relationship between teaching staff and librarians. It is suggested that different responsibilities which librarians will be expected to assume will include controlling scholarly electronic publishing, protecting copyright and preserving intellectual property, more active involvement in promoting information literacy and 'creating order out of the chaos that is the Internet'. One way in which the librarian can do this is to take an active part in the organisation of the web. This may be done either through development and promotion of standards for describing web documents (e.g. the Dublin core metadata tags) or by actively cataloguing specific sections of the web which are of particular interest to specific groups of library users. The latter type of intervention was explored in the NetLearn and ReMOTE projects described below.

The second of these developments is inextricably interwoven with a variety of socio-economic and political factors which are currently having an impact on education in the United Kingdom. An obvious feature of higher education in the past few years has been its rapid growth. Throughout the university system in the UK there has been an increase in both student numbers and the variety and modes of attendance of courses. The MacFarlane report [9] predicted a 50% expansion of the total student population in the UK by the year 2000 and this prediction seems to have been accurate. It has become imperative that cost effective solutions should be found to deliver higher education to a wider audience and at the same time the diversity of the student population makes traditional patterns of teaching much more difficult to maintain. There is a real trend towards off campus education and a more overt recognition that academic establishments must strengthen links with prospective employers of their students - not simply in terms of collaboration over research and consultancy but in providing ongoing training which extends into the workplace. The pace of change in our technological society is so rapid that work and learning can no longer be viewed as separable and the notion of higher education as an accelerated period of knowledge acquisition in order to gain an accredited qualification is being questioned. Recent developments in the higher education curriculum for many courses have emphasized transferable skills such as information handling skills, enterprise skills and communications skills and demonstrate a serious response to the challenge of preparing graduates for a working environment in which flexibility and the ability to learn are critical factors for success. This has fostered an enthusiasm for what has been termed 'lifelong learning' - the acceptance that skills and knowledge acquisition are a vital part of human activity and must be supported at every stage [10]. Part of this process is to produce high quality teaching materials which can be easily distributed to distance learners and used as the basis for continued professional development, but as was pointed out at the start of this article there is still a role for the library in supporting students and assisting learners to make full use of these resources and others which are available to them. Taken in conjunction with what has been said about the nature and location of the learners who require this support it is contended that effectively the librarian is inevitably going to look at ways in which training in information skills, which is traditionally offered to all campus based students, can be effectively delivered to support a much wider range of users. The manner in which this support may be offered is considered below when looking at the Information Skills for Open Learning projects.

Ultimately as Wilson concludes in his article on the role of the librarian in the next century, "in the end the future role of the librarian is going to be what you [the librarian] want it to become - and I speak for those for whom the early years of the 21st century will be within their working lives" [11] It is contended that in order to stay relevant in the next century action must be taken in relation to the trends identified above. Librarians have to become adept as information intermediaries to both 'real' and 'virtual' collections. We need to produce professionals who are adept both at handling the technology and understanding how it can be appropriately applied in library and information centres. This implies not only that librarians have to be equipped with the necessary ICT skills in order to undertake this role but that they also have to make a significant effort to broaden and apply their traditional skills as information managers to encompass electronic resources. Evidence of the demand for this type of graduate has been found and has prompted the School of Information and Media at the Robert Gordon University to offer 2 new courses - a postgraduate Masters in Electronic Information Management which is offered jointly with the School of Electronic and Electrical Engineering and an undergraduate programme in Computing and Information which is provided in conjunction with the School of Computing and Mathematical Sciences.

As Ferguson points out when considering the role of the academic library, 'It becomes more a concept with emphasis on services than a place with emphasis on collections' [12]. The move towards converged services (library and computing services) has to a certain extent accelerated this process. But it could be argued that this convergence of information services within academic communities must also be expanded to encompass more active co-operation between all sectors of the library community in order to build integrated networks to facilitate both access to learning resources and skills to use these resources effectively. The role of the librarian will thus require people or groups of people with sufficient expertise to manage the technology and a firm knowledge of the important objectives which have to be achieved in terms of the new services which the library has to offer and the global environment in which these services operate.

3. Web based Research and Development projects at RGU

The impact of the Internet on teaching and learning has been a subject of concern to a group of researchers at the Robert Gordon University over the past two years or so. The approach taken to the question of how librarians can prepare themselves for their new role in electronic networked environments has been essentially practical and the team have sought to develop projects which provide practical evidence of the manner in which the information professional can operate effectively rather than simply to speculate on the potential benefits or threats to established working practices. At the outset of the first of these project (NetLEARN) it was obvious that the technology was in a state of flux but it was decided that there was much to be gained from experimenting with use of systems in order to establish procedures and expertise in developing web resources even if (as proved to be the case) the actual systems might require considerable modification in the light of possibilities offered by new hardware and software. This paper will outline some of the projects on which the researchers have been engaged and demonstrate how these relate to the general theme of how librarians can effectively support learning via the Internet.

3.1 NETLEARN

The NETLEARN project was a SHEFC (Scottish Higher Education Funding Council) initiative which involved the development of a WEB site at The Robert Gordon University which provides a directory of resources to support academics and students who wish to retrieve relevant information on WEB based materials to support teaching and learning Internet skills. The project was initiated in 1996 and development and maintenance of the site is ongoing.

The initiative was developed largely as a response to meeting the challenge of providing an easy means for educators to access the growing range of teaching materials which were available directly or promoted via the Internet. In 1996 Shotsberger surveyed existing efforts at using the Internet for instructional purposes [13] but any attempt to provide a comprehensive survey today would be doomed to failure. Keeping pace with the growing number of Web based resources and quickly determining their relevance for specific teaching applications was becoming a gargantuan task.. It had become apparent to many commentators that the rapid growth of such resources was creating considerable difficulties because of a range of familiar problems : inadequate organisation of the WEB; deficiencies in search engines; and the lack of a standard description of WEB based materials.

For librarians these problems might be translated into the more familiar problems of classification and cataloguing: however, the traditional approaches offered by librarians to provide solutions to these problems for large print based collections of resources were obviously inappropriate for providing a practical solution to the very real need to develop a support mechanism for academics working in this field. The proliferation of a large number of Web sites with very similar content both exacerbated the problem and indicated the need to raise awareness of existing materials in order to stem the tendency towards duplication of effort. Despite the much heralded development of more sophisticated search engines to increase the relevance and precision of the material provided in response to user queries those who have experience of searching the WEB would generally concur that search tools remain inadequate with respect to providing precise, detailed and exhaustive indexing of the vast "hyper-structure" of the Internet, subject as it is to continual extension and revision. In order to examine the practical problems which information workers would face when attempting to subject part of the web to 'bibliographic control' that the project sought:

- to identify educational and Internet training resources presently available via the World Wide Web
- to create a directory of Web-based educational resources which would allow others to identify these resources, locate them and evaluate their relevance and utility
- to make the NetLearn directory available via a Web site which would provide for users critical and descriptive information about the educational sites and allow users to connect directly to the sites themselves

Newton et al. [14] provide a description of the methodology by which the site was developed. Essentially, directory entries were created for identified resources and these were collated into an HTML (HyperText Markup Language) document which was placed on The Robert Gordon University's WWW server. Entries for all selected sites include an abstract, consisting of an overview of the available materials, together with a number of fields indicating the nature of the site in terms of, for example, the medium of delivery, the presentation style of the site, the site's currency and additional evaluative comments. The 'catalogue' entries were created using a format illustrated in the following example:

> **Beginners Central - Excellent online tutorials covering the basics of web surfing. Manageable size, stays practical and therefore easily absorbed. Includes FAQ list and the facility to email your own questions. Beginners' Central has been rated a 4 Star site by NetGuide Magazine and I-Way magazine has chosen Beginners Central as one of the top 500 web sites in the world.**
>
> **MEDIUM: - WWW (with email question service available) STYLE: - Page turning COMMENTS: - Good coverage of practical usage issues. Well designed, highly recommended by others. CURRENCY: - Updated monthly**

Figure 1: Example of revised link and abstract

A variety of feedback mechanisms were used both to monitor use of the site and attitudes to it. The result of such evaluation showed conclusively that the NetLearn project provided a successful model for facilitating access to Internet resources which emphasises the importance of the expertise of individuals (in particular information professionals) rather then relying on technology based solutions for managing information retrieval from the web. The site can be accessed on The Robert Gordon University Web Server at:

http://www.rgu.ac.uk/~sim/research/netlearn/callist.htm

Figure 2 The Netlearn home page

3.1.1 Implications for the role of the information professional

The project aimed to show how information professionals could use their traditional skills in classification and cataloguing of resources to provide a service with added value and which went beyond the bounds of single institutional catalogues of resources. It is suggested that the extension of the methodology employed in this subject area to others would provide considerable benefit to those who wish to identify relevant WEB based materials. The feedback from the NetLEARN project certainly seems to indicate an enthusiasm for providing a directory to assist ease of access to educational resources within a narrow subject range. The challenges for the future are:

- how to expand on this approach and develop a strategy which may prove to be more generally applicable to a more extensive organisation of the Internet and
- how to implement a strategy for systematically maintaining such initiatives.

There is a role for a range of participants via some form of collaboration amongst those that have traditionally been involved in the production of bibliographic tools, such as publishers, interest groups, academics and libraries. There is also, it is argued, a need for an overarching vision that would determine how those developing such tools might together work towards a form of 'universal bibliographic control' of the Internet, avoiding unnecessary duplication and gaps. It is suggested that, as indicated by some user feedback from academic and educational support services staff, this is an area in which libraries could play a central role. This echoes the sentiments of Schneiderman [15] that, because of their skills, librarians potentially have a key role in 'organising the Internet'.

The task of creating and maintaining Internet directories to cover a large range of subject areas is obviously too daunting for any single library. However, it is suggested that by developing a suitable strategy to develop a collaborative approach by the library community a significant impact could be made by providing a range of well maintained Web directories. Indeed the creation and integration of such directories with the print based collections of a particular library provides an opportunity for the library to enhance its service significantly by organising and providing access to a much wider range of information sources. Furthermore, in what has been termed the Hammond Initiative project EARL is currently investigating the potential for development of a large range of subject specialist Internet sites to facilitate access to and use of a range of topics (from a public library reference service perspective) and to "index them and keep them available for public library staff to use as reliable and authenticated sources of information" [16]. The project team suggest that NetLearn may provide a useful framework for developing such an initiative.

3.2 ReMOTE

The ReMOTE project was an internally funded initiative at the Robert Gordon University which involved the development of a web site which aimed to:

- provide an organised directory of external links to other WWW based teaching and learning materials on research methods
- integrate this with a 'library' of materials which had been produced in-house and were to made available via the Web and
- provide an interface to allow incorporation of these materials on a variety of taught undergraduate and postgraduate programmes.

Virtually all UK Higher Education Institutions teach research methods, either at the latter stages of undergraduate study or in postgraduate programmes, where research methods is seen as a key component in preparing students to undertake study leading to an MA or MSc qualification. Typically the topic is taught as a programme of lectures and seminars.

The key features of research methods which makes it an appropriate area to develop as an internet resource are that:

1. it is generic and transferable. The end product will be applicable throughout RGU and all HEIs across a wide range of courses.

2. because of the wide range of potential topics which it is designed to support, students find that they may have to concentrate their efforts unevenly on different components within research methods: some may, for example, require more detail on quantitative analysis, whilst others do not need to study this topic in such depth because it will not be applicable to the type of dissertations or projects in which they are engaged. It is envisaged that the basic units will be extensible to allow students to explore in greater depth areas of the subject which are of interest to them whilst clearly making them aware of the knowledge and procedural requirements for achieving credits on the course, by exploring web links to more specialist sources. As such, the system will be particularly useful on postgraduate programmes of study, where students may require simply to upgrade some specific skills or techniques and can do so on an Open Learning basis.

3. the environment in which the project will be operating (the WWW) is one which is intrinsically important in conducting practical research and the mechanism of delivery can be viewed as an important part of the learning process itself.

It is therefore apparent that such a widely applicable skill as Research Methods, and such a ubiquitous medium of delivery as the WWW are ideally suited for the development of a resource centre which will be of global utility. While it is acknowledged that other WWW resources exist for teaching Research Methods or facilitating in the research process, the former typically concentrate on a subset of skills appropriate to a particular discipline or a single aspect of Research Methods, while the latter (e.g. SOSIG)[17] tend to offer sites of use to researchers, and a few selected sites for teaching the subject. Pachnowski et al.[18] provide a useful discussion of some of the sites available which provide databases and examples of surveys of resources (e.g. the US Census Bureau http://www.census.gov) and the Gallup Organization http://www.gallup.com) but does not provide any detailed guidance on application of these resources in teaching. Useful resources are also provided by a range of directories - the Educator's Internet Yellow Pages[19] being a particularly good starting point. More specifically related to research methods work by Cozby[20] provides an excellent guide to resources - each chapter of the book directing the student to a wide range of web resources and there are a number of web sites which give detailed tutorials on specific research methods concerns or techniques (e.g. BeLue's Choosing a research design http://trochim.human.cornell.edu/tutorial/belue/belue.htm and Burn's pages on Securing internal validity http://trochim.human.cornell.edu/tutorial/burns/int.html). The aim of ReMOTE was not only to provide a direct link to such specialist sources but also to integrate this with easy access to teaching materials which had already been developed within the University and which the project team converted from paper based to web documents. Both categories of material were to be used as "plug ins" when developing tailored Research Methods courses tailored for specific taught programmes. It was envisaged that staff would create pathways through the 'electronic library' which was being built up by making links from online programme descriptors to appropriate 'readings' - using links to online materials in the same way as references to the sources would normally be given in paper based documents. This resource library might therefore contain, for example, interactive CAL packages, which are available freely via the WWW and which could be conveniently downloaded and used in teaching or self-study, online texts or journal articles or sources of statistical data. The project, therefore, sought to extend on the experience gained in creating the NetLearn directory to cover additionally the problems posed by integrating an in-house library of materials to which there were necessarily limitations of access for non-registered students. In addition to developing research methods teaching materials the project team have also experimented with using the same interface to develop and deliver materials on Communications Skills and are currently involved in a project to deliver parts of a teriary level teaching programme via the web. The ReMOTE site is available at:

http://jura2.eee.rgu.ac.uk/dsk5/research

Fig. 3 The ReMOTE home page

3.2.1 Implications for the role of the information professional

It became apparent that there were a number of issues related to the development and maintenance of the ReMOTE directory which fell directly within the domain of the information professional. As with NetLearn, there was obviously a role in maintaining the directory itself but additionally it was felt that the areas of this project which involved questions related to copyright of material, rights for downloading or mirroring material from other Internet sites and provision of advice to staff on legal and ethical issues in the use of online sources were areas which should fall directly within the domain of the librarian.

In examining feedback it was also recognised that an important area in which ReMOTE was weak was that it was not an integrated environment for all teaching materials. At the least it was felt that to compensate for the relatively small amount of material available in comparison with the print based materials held in the University library that students should have been provided with a transparent interface to the library catalogue to see a wider range of relevant published material in very specific disciplines. They would then have been able to check its availability at the point at which they were making use of the online materials. Indeed students should ideally have been able to access to some of these published materials in electronic form. Such considerations were beyond the remit of the project which only examined the use of freely available electronic resources on the web and the materials specifically written by academic staff of the University to support their teaching and which could be made available via the web. Again, however, it provided evidence of the important role which the information professional could potentially fulfil in integrating bibliographic data and digitised texts within tailored learning environments. Certainly some of these issues are being examined and the development of 'virtual library' collections by projects such as SCOPE, LAMDA and e-LIB are significant developments in this respect and there are a host of projects concerned with the development of electronic journals. But it was felt that the current mode of access to electronic materials was too fragmented and administratively restrictive when attempting to create a learning environment in which the student has access to the material without necessarily having to be unduly concerned about the mechanics of getting it.

The ReMOTE project also involved the project team in careful consideration of mode of access to materials for students and inevitably the way in which they system could potentially support distance learners. Whilst provision of tailor made materials via the web offered potential benefits for distance learners there were practical problems related to security of the University Intranet and security of copyright. The digitisation of material for distribution via the web is potentially critical in terms of the development of the information professional's role in supporting all learners but the careful management of access to the material is equally critical. In terms of digital collections of materials we have a reflection of some of the inbuilt inequalities which currently apply to print based library collections. Whilst few would argue with the principle that all students should be given access to the full range of a library's collection, in fact it is obvious from preliminary review of provision for distance learners that there are considerable inequalities in provision [21]. The project team were thus enthusiastic when offered the opportunity to collaborate with a public library authority in a project which sought to create a much more integrated approach to proving access to Internet resources in a public library environment.

3.3 Information Skills

Early in 1996 South Ayrshire Libraries submitted a proposal to the British Library Research and Innovation Centre's Digital Libraries Programme. The proposal outlined a plan to enhance public library support to users who were engaged in open or distance learning by identifying and classifying a range of learning resources which could be accessed over the Internet. This was to be accomplished by designing and developing a Web based directory to support open learners. In addition it was planned that references to locally held open learning material should also be included in the directory. The proposal included a preliminary stage which involved collaboration with the Robert Gordon University School of Information and Media to develop information and skills training for independent learners. It was envisaged that this would take the form of a Web based resource which collated various learning skills packages which have are currently available on the Internet. This could then be used as the basis for developing Information Skills courses which could be run locally by staff in the public library.

The key to providing students with a knowledge of what is available to support their studies is through the information services provided by the libraries. In a learning environment in which we recognise the importance of exploratory learning it is vital that all students are provided with the skills to make effective use of library catalogues and other bibliographic and information databases and be given an appreciation of the most effective strategies which should be adopted when attempting to gather material or find specific answers to questions. In projects completed to date it could be assumed by the project team that students had access to some very sophisticated learning support mechanisms and in particular had transparent access to a range of university library catalogues, access to CD-ROM bibliographic databases and CD-ROM based publications But most important of all it could be assumed that students had access to training and support in the use of information services. Most students would have been provided with a fairly detailed introduction to information skills as part of their campus based studies - often via the library service.

When working on the Information Skills project in collaboration with South Ayrshire Libraries the project team found that it had to adopt an entirely different approach to developing an interface to support learners. This was mainly because of the huge diversity of the learning community and the purpose for which they wished to gain information. Within the remit of the project 'open learning' is seen as the opportunity for people to learn whatever they can, whenever they can, wherever they are. No boundaries in the type of subject specific resources to be offered and the project encompassed a wide variety of learners - business people, school, college and university students, the person who wants to acquire new skills in order to obtain employment or to make progress at work, the retired person who wishes to learn something new, the woman who wants to update her skills and knowledge in order to return to paid employment, indeed, any individual who feels that the provision of learning opportunities would bring greater fulfilment to their personal or professional lives. A different approach was also necessary, however, partly because the project team found that it was making assumptions about background skills and knowledge of these learners based on the relatively high level of information skills which were evident in the campus based students populations with which we had previously dealt. It was not the intention of the project to duplicate existing electronic resources for providing information or network learning skills. However, examination of a number of such initiatives showed that typically these were inappropriate as a starting point for providing a suitable interface for the general public. This is not a criticism of the quality of such packages but rather a recognition that most such initiatives have been developed expressly for use by academic staff and students studying within a traditional campus-based environment. For example there has been significant work in academic libraries as is evident in, for example, the EduLib project, set up following the Follett Report (http://www.hull.ac.uk./Hull/CTLS_Web/edulib/edulib.html) and Netskills (http://www.netskills.ac.uk./intro.html), which focuses on the Internet. These projects were designed expressly to help "the UK higher education community to develop network skills for teaching, research and administration" [22]. The project team therefore developed a customised information skills training package based on the work of Marland who sees the the use of information as a cyclical process, expressed as questions which would be useful to the majority of users, no matter the subject area being studied.

The questions are as follows:

1.	Why do you need the information?	This attempts to define the information need in the user's mind, in order to specify as far as possible what the requirement for information is.
2.	What kind of information do you need?	This reveals to the user, if he was not already aware of it, the range of types of information which are available, and which are useful for his purpose.
3.	How will you find the information?	Places to look for information and retrieval methods.
4.	Which information will you use?	Analysis and evaluation and organisation of the information retrieved.
5.	How will you present your information?	If a formal presentation is necessary, suggestions are made as to formats.
6.	Have you answered your question and what have you learned?	Reviewing the above process and evaluating its success.

Table 1 - Marland's Big Six Questions

The above information is presented in two ways. The initial introduction to these concepts is underpinned by a more in-depth analysis of these steps for the learner who wishes to pursue his study further. This is achieved by a series of hyperlinks.

Fig. 4 South Ayrshire Libraries Information Skills

The tutorial package also provides links to further information skills resources on the web, such as the use of browsers, search engines, reading skills, critical analysis of information, and the use of references and bibliographies. Thus, traditional information-related skills are smoothly integrated with new information skills, or IT skills as they are often called, in the aim of allowing a seamless use of information no matter how it is provided and accessed. One corollary of this method will be, hopefully, to eradicate the barriers between text-based information and electronic information for the user, and therefore to allay their potential fear of new technology. The South Ayrshire Library Information Skills site is available at:

http://south-ayrshire.gov.uk/blric/project.htm

Fig 5. South Ayrshire Libraris Information Skills homepage

3.3.1 Implications for the role of the information professional

The most significant implication for academic librarians from the work conducted in conjunction with South Ayrshire Libraries is that there is a pressing need to develop information skills packages for students. These must go beyond being introductions to particular library services and should cover the generic information skills with which all students should be equipped before embarking on a course of study. An interesting aside connected with the public library based project is that one student commented very favourably on the information skills package expressing the opinion that he wished his own library (a local academic library) had provided this sort of training. With the plethora of resources available to them and the multifarious interfaces for accessing these resources efficiently, it is imperative that library staff make a concerted effort to assist students through the 'information maze.'

To an extent this can be facilitated by using interactive teaching software which can be customised for particular environments - such as, for example, Aberdeen University Library's CALAIS package. It also requires, however, a more general approach by libraries to the issue of information skills development and in particular a collaboration between different library sectors - school, public, academic - in order to ensure that the library user can acquire and use such skills irrespective of the particular sector in which he/she is learning.

4 Conclusion

The paper has illustrated a variety of practical situations in which librarians are beginning to have an impact on developments on the Internet and ultimately having an impact on lifelong learning by providing organised interfaces to resources. In the area of information skills training it is argued that the librarian must contribute actively by developing these resources and ensuring that students and academic staff are made aware of their critical importance to learning. It is obvious that we have some way to go before we can achieve Stephens and Unwin's vision of "a more hopeful and exciting future, in which academics and librarians collaborate to expand the pedagogical boundaries of ... learning, ensuring that the electronic developments are integrated with traditional concerns for wide reading, student autonomy and independent thinking" [23].

There is, however, growing evidence of a convergence of effort by librarians to meet these objectives - sometimes in the face of administrative and market forces which focus on competitive developments. Now with more attention being given to the need for learners to assimilate a broad range of information drawn from a wide range of source material and the recognition of the importance of 'learning to learn' there is an opportunity to develop a more holistic approach to providing access to resources through the an integrated library network. Chris Yapp comments that "Our experience to date suggests that there is a great appetite in the UK for learning in all sectors of society. The goal is to harness this energy for economic and social well-being" [24]. However, there is an interim goal which has to be achieved and that is to develop a working strategy for delivering and supporting such learning. The information professional should and must be central to that strategy.

Acknowledgments

The authors would like to acknowledge the contribution of two postgraduate students, Andrew Gibson and Stephen Browne whose work on distance learning support and the changing role of the information professional has been instrumental in providing some of the observations and conclusions outlined in this paper.

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Back to contents

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IATUL

LAUNCHING TRANSFORMATION AT THE ACADEMIC INFORMATION SERVICE. UNVERSITY OF PRETORIA

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Introduction

The management philosophy of the Academic Information Service finds parallels and emulative models in the so-called New Science, in particular the chaos and complexity theories, quantum mechanics, information and field theories.

During the next few minutes the following analogous relationships between 5 aspects of the new science and those of the organisational transformation at the Academic Information Service will be discussed.

- The relationship between creativity at the edge of chaos and organisational creativity and innovation
- The relationship between quantum mechanics and client-centred teams
- The relationship between the creative energy of information and management information systems
- The relationship between invisible fields and the strategic vision or focus
- The relationship between chaos theory and the organisation's values and culture.

Creativity at the edge of chaos

The new scientific discipline known as the complexity theory centres on the realm between chaos and order; it is the emerging science at this edge of order and chaos.

The second law of thermodynamics predicates that the universe has been governed from the beginning of time by a tendency towards disorder, dissolution and decay. Yet this same universe has also managed to provide structure on every scale: galaxies, stars, planets, plants, animals and brains. The complexity theory looks at systems which are complex and yet show signs of spontaneous self-organisation and adaptability.

Complex systems have somehow acquired the ability to bring order and chaos into a special kind of balance. This balance point- often called the "edge of chaos" is where the components of a system never quite lock into place, and yet never quite dissolve into turbulence, either. The edge of chaos is where life has enough stability to sustain itself and enough creativity to deserve the name "life".

This edge of chaos is the constantly shifting battle zone between stagnation and anarchy, the one place where a complex system can be spontaneous, adaptable and alive.

Creative organisations are complex systems, capable of spontaneous self-organisation and sufficiently adaptable to be able to balance on the edge of chaos. But how do you structure such a complex organisation? The answer to this question is to structure it as minimally as possible.

The Academic Information Service is structured on the concept of a flexible project-based network organisation. Groups and teams which form essential components of this network comprise:

- Client-centred service teams (structured in line with our key business process of a "one-stop information service" for each faculty)
- Support teams, such as information technology
- Strategic management team
- Suppliers

Corporate strategies and projects are translated into team strategies, projects and actions.

Project teams consist of members from any part of the network formed into a temporary working arrangement, which dissolve on completion of the project.

The relationship between quantum mechanics and client-centred teams

Poised at the end of the 20th century, our organisations, structured on the principles set down by Sir Isaac Newton, are now crumbling. For 3 centuries we've been planning, predicting and analyzing the world.

Structure has been paramount. Responsibilities have been organised into functions; people organised into roles. The fundamental tools of our organisations have been organigrams, flow charts, design models, numerical data - all elements which have ensured structure, structure and more structure.

We believed that if we studied the parts we would arrive at knowledge of the whole, so we have reduced and described and separated things onto cause and effect and drawn the world into lines and boxes.

The reason we did this, was because it fitted the universe as described by Sir Isaac Newton. We absorbed expectations of regularity into our very beings and organised work and knowledge to fit this universe.

The development of the New Science heralded the demise of Newton's organisation domination. Discoveries of a strange world at the sub-atomic level could not be explained by Newtonian laws, and a new theory, quantum mechanics was developed. This has lead to a new way of comprehending the universe, and ultimately the way we look at organisations.

The quantum world is a web of relationships. Everything is inter-connected like a vast network of interference patterns.

This world of relationship is not just an interesting fact - it is all there is to reality. Wheatley quotes Henry Stapp who describes elementary particles in the universe as "a set of relationships that reach outward to other things".

In quantum terms no-one exists independently of relationships with other people. Each of us is a different person in each different context or place.

Translated into organisational language the quantum mechanics theory demonstrates 8 principles:

- the era of the individual has been replaced by the era of the team player
- We should stop describing tasks and instead facilitate processes
- The most essential skill is the ability to build strong relationships with internal and external clients and colleagues
- Participative management makes leadership a skill required by all personnel
- Instead of detailed planning and analysis, structures that foster relationships become important
- The whole of the organisation is more than the sum of its parts

- Improvisation and the ability to be flexible are paramount.

The transformation process at the Academic Information Service started with big structural changes. Hierarchies gave way to a network of teams. Individual services were defunctionalised and service units started serving specific client groups.

Structural changes, however, can only set a climate of change. Real change can only be achieved by the core asset of any organisation, its people. True transformation only takes place when the people are no longer driven by change but change is driven by the people.

One of the most influential vehicles in this regard was the development of a new competency model. But what started out as a competency-based management system became rather a model for development.

A project team, with the help of an external consultant, and integral participation from people on ground-floor level, developed a model to ensure that all teams have the necessary skills to facilitate the key business process.

The individual competencies within the team may vary as long as the team as a whole has all the competencies to deliver the services needed by its clients. Generic competencies, which include networking, leadership, and client relationships ensure that all personnel develop the skills needed for the new organisational environment.

The model also makes provision for team bonuses if pre-determined goals are reached.

360 degree feedback is used to facilitate the quantum relationships.

THE CREATIVE ENERGY OF THE UNIVERSE - INFORMATION

Within organisations, information has traditionally been seen as a product or a "thing" which is generated by the activities of the organisation itself. This view of information as a consequence of organisational behaviour has, in turn led to the view that information is or should be substantially predictable and controllable.

Access to information within organisations is managed as other products and is generally disseminated on a "need to know" basis.

The new sciences show us that information is not a reaction to happenings within an organisation, but is in itself a dynamic force. Information in its various guises provides order, growth and definition to the organisation.

The validity of this hyothesis can be illustrated by analogy from the medical sciences. We're all very conscious of the fact that our hair and skin constantly replace themselves; lesser well know is the fact that our internal organs also replace their cells on a regular basis. The remarkable thing is that in spite of all this constant renewal of the cells of our bodies, our structure as human beings remains constant. The driving force behind this phenomenon is the information itself that is contained in our DNA which serves as both the organiser of matter and the structure-provider.

As Chopra says "All of us are much more like a river than anything frozen in space and time"

Information, thus, provides the form or structure which is manifested in a physical shape.

Margaret Wheatley, in affirming this function of information says that it is apparent in the very composition of the word information itself. In-formation. Information is the very key to the resulting structures of organisations. So rather than us controlling information, it is information which controls us.

The continuing existence, strength and integrity of organisations depend on 3 elements:

1. the continuous generation of information within the organisation. Information is self-generating and has been described as the solar-energy of organisation.
2. However, in order to function to its optimum it is vital that information is allowed unrestricted free-flow to all parts of the organisation to cross-pollinate the experiences and inter-actions of the members of the organisation. (Chaos is an unsurpassed generator of information).
3. The ability to function as a responsive and open system is vital. The level of consciousness of an organisation predicates its capability to process information.

The lessons from this science-based theory have been adapted by the Academic Information Service and form the focal point of its information management strategies which, at this stage, find their voice in three main activities; an input/output measurement system; the balanced scorecard and a annual services-impact study conducted amongst clients.

Academic libraries are inclined to take a rather linear view of the statistics they collect. Raw data is taken in and produced as proof of productivity or as lobbying chips especially in budgetary negotiations. We view information as a strategic tool which guides not only the structure of our organisation but also constantly dictates changes which need to be made in collection models.

Our input/output measurement system is based on that of Griffiths and King as modified for our transforming organisation by Dr Heila Pienaar. This model allows us to assess the costs of providing services to our clients whilst at the same time to monitor our compliance with and progress towards the strategic goals of the University itself. More emphasis is placed on the interpretation of the measurement in strategic terms than on the mechanics of collection.

The Balanced Scorecard is a complementary model which links different performance measures in a holistic strategic management system. The attainment of long term strategic goals is enabled through the use of a quartet of management processes and perspectives:

1. Translating the vision which ensures consensus of shared vision and strategies throughout the organisation
2. Communicating and linking ensures there are open communication channels which allow multi-directional free circulation of organisational information
3. Business planning provides for the alignment of organisational plans with financial and other resources
4. Feedback and Learning empowers our organisation to become a truly "learning organisation. Information which is fed-back through theses processes reshapes the organisation via modified strategies. We are in a constant state of positive change which is seen as integral to our continued successful service-culture.

These 4 processes are put into focus through 4 perspectives:

- Client perspective. How do our clients see us?
- Our internal perspective. What must we excel at?
- Innovation and learning perspective. How can we continue to improve and add value to our core business processes?
- Financial perspective. How do we look to our stakeholders.

One of the most beneficial aspects of these creative information systems is that they operate equally successfully on both the micro (that is the personal) and the macro or organisational levels. This ensures parallel growth and development of personnel and the organisation.

The 3rd method of information collection and management is the annual impact assessment of our products and services carried our in different sectors of our client base. Listening to the voices of our clients through varied structured and open questions we are able to change our way of doing business to meet their expressed, implied, or potential expectations.

The harnessing of the creative force of information within our organisation has given us new direction, shape and focus.

Invisible fields that shape behaviour

Space is the basic ingredient of the universe; there is more space than anything else.

Even at the microscopic level of atoms there is mostly space; 99.999% of an atom is empty.

Space is no longer seen as an empty void. The New Science postulates that all space is filled with fields - invisible, non-material structures. We cannot see these fields but we are able to observe their effects.

Examples of such fields are gravity, magnetic fields, and electricity. The universe can be visualised as being filled with interpenetrating influences and connecting invisible structures. There is potential for action everywhere; any place where 2 fields meet.

From our sun the solar wind, comprising millions of charged particles, streams with enormous speed towards the earth. En route they intersect with one of the earth's invisible fields - the magnetic field. This interaction creates the aurora polaris, better known as the northern or southern lights The power and energy of this invisible field are brilliantly demonstrated in dramatically coloured light-shows.

Organisational space can be seen in terms of fields with personnel, suppliers and clients as waves of energy.

These waves of energy spread out in all directions inside the organisation, with exponential growth in potential energy.

Electronically-generated information, invisible, but essential is floating along the air-waves. It can be retrieved from the ether, which means that space is an integral active role-player in our organisations. The term cyberspace is used to describe this phenomenon.

The electronic flow of information can be compared with the solar wind - the beams of electrons from our sun.

The invisible magnetic field can be seen as our clients' or information seekers' needs.

What happens when the information interacts or comes into contact with the information seekers' needs.

The preferred reaction should be that the information and the information needs connect and fit each other like connecting puzzle pieces, resulting in a feeling of "eureka" or "success".

The intersection and connection between the information and the client's information needs should result in the creation of knowledge or more knowledgeable clients.

The antithesis of this is the client bombarded with jargon, information overload and technical hitches.

To assist the Academic Information Service in moving towards our preferred seamless, integrated user-friendly environment, we are running a digital information service project. Our vision is multi-faceted:

"To establish an integrated transparent, web-based system for the retrieval and manipulation of all types of information - including full-text and human expertise.

"To create a virtual environment for information handling

"To evolve towards the integration of our key business process with the teaching function of the university

"To increase the productivity of our clients -academics and students"

Many of the ethereal qualities within organisations such as

culture,
values,
vision and
ethics

operate as invisible fields. These fields can influence behaviour and development, and compel and organise particular activities or processes.

For example education, research and community-service based works together can combine to deliver knowledgeable, and competent professionals into the knowledge society.

We cannot see all the fields active within our organisation - but we can observe their effects.

Chaos and the strange attractor of meaning

The essence of the chaos theory is that seemingly simple rules can give rise to extraordinarily intricate behaviour, as witnessed by the endlessly detailed beauty of fractals or the foaming beauty of a river.

This secret heart of chaos has been revealed by using computers. The computer tracks the evolution of a system. The system careens backwards and forwards with violent unpredictability, never showing up in the same spot twice. But as we watch, the lines weave their strands into a pattern, and an order emerges out of this disorder. The chaotic movements of the system have a shape, which the New Science terms a "strange attractor" and this is an irrefutable indication of order which is inherent in chaos.

Margaret Wheatley in her book "Leadership and the New Science" pondered whether it was possible to identify such a force at work inside organisations. Is there such a force, a basin for activity, so compelling or attractive that it pulls all behaviour towards it and thereby creates coherence? She postulates that there are such attractors at work in organisations and that one of the most potent of these is "meaning". Meaning is a defining force in both organisational behaviour and life itself.

The strange attractor of meaning can be related directly to an organisation's values, basic assumptions and culture. Culture can be seen as the underlying force which makes organisational transformation possible.

This exploration into possible relationships between the New Science theory and the organisational transformation of the Academic Information Service has thrown new light on transformation in organisations and has opened new avenues of thought about organisational life for us.

Back to contents

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IATUL

COLLABORATION BETWEEN A TECHNOLOGICAL UNIVERSITY LIBRARY AND TENANT FIRMS IN A TECHNOLOGY PARK IN THAILAND : NEW CHALLENGES FOR LIBRARIANSHIP IN A DEVELOPING COUNTRY [*]

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1. Background

There has been active collaboration between Thai universities of technology and industry since the national economic boom of the 1980s. In the main, such collaboration includes activities on a short and medium term basis, such as the university providing requested training, short courses and consultancies, and conducting research and development in some areas for the industrial sector. However, this collaboration has not as yet been formalised through the mechanism of science or technology parks.

The concept of setting up university-owned technology parks in Thailand emerged in 1988 following the Ministry of University Affairs' feasibility study about this matter subsequent to the incorporation of the science park development concept in the Sixth National Economic and Social Development Plan (1987-1991). [1] Foremost universities around the country were encouraged to propose technology park establishment projects to the government. A technology park establishment project [**] proposed by King Mongkut's University of Technology Thonburi (KMUTT) [***] was accepted in 1990 but the actual establishment of the park and other faculties commenced only in 1993 at its new campus. [2] Construction was expected to be completed this year (1998), but has been delayed since mid 1997, due to the national economic collapse and turmoil. [3] Currently two technology parks funded by the government are in the process of establishment in Thailand, one is university-owned (by KMUTT), the other, which is called Science Park, is being implemented by the National

Science and Technology Development Agency (NSTDA), Ministry of Science, Technology and the Environment. Even though Thailand is facing economic crisis, the two Parks still receive good support from the government because their establishment objectives are to assist SMEs. For example, through government incentives, the KMUTT's Technology Park would be able to provide Thai technical entrepreneurs who have limited finances with opportunities to start their business or develop pilot plants for industrial processes and products by giving assistance in premises, incubator units, equipment and technical information. [4]

2. What is a technology park?

There are various initiatives designed to stimulate university-industry collaboration, such as research park, science park and technology park. The generic term 'science park' usually refers to those initiatives [5]. While there are some distinctions between these terms, the three share major characteristics which are best described by the United Kingdom Science Park Association (UKSPA). The Association defined a science park as "a property-based initiative which [6]:

- has formal operational links with a University or other Higher Educational Institution, as major

centre of research;
- is designed to encourage the formation and growth of knowledge based business and other organisations normally resident on site;
- has a management function which is actively engaged in the transfer of technology and business skill to the organisations on site.

The term Science Park may be used to include initiatives called by other names, eg. Research Park, Innovation Centre, High Technology Development, etc., where they meet the essential criteria set out above".

The distinctions between the three terms : research park, science park, and technology park are discussed by Dalton [7] and Grayson [8]. Research parks restrict their activities to pure research, development and prototyping whereas Science parks allow limited scale manufacturing along with research and development programmes. Technology parks, on the other hand, are normally designed to accommodate firms engaged in the commercial application of advanced technologies and some full scale production may be permitted.

3. Challenges to Thai Academic Librarians

When the KMUTT's project of setting up a technology park was approved by the Thai government in 1990, its university librarians were eager to get involved in university-industry collaboration. Unfortunately, we have no local experience because no Thai university library has ever been involved in the technology park business. At that time, we did not even understand what a technology park was; why the university would spend a lot of time and effort developing one; who would be housed there; and, what would they do. Additional major questions regarding library involvement in a technology park project continued to emerge, for example -was there any role for the library in such a collaboration? -what are the information needs and the information-seeking behaviour of tenant staff members? and -what kind of information services could be offered to them?

Answers to these questions could be obtained from literature searches overseas, collecting data mainly from developed countries. These, of course, would differ in circumstances from our own particular case as a developing country. Our university librarians realised that we needed guidelines to direct our involvement in such a collaboration which would be used not only by KMUTT library but also potentially by other Thai academic libraries. We considered that research on this particular topic should be undertaken somewhere we could gain not only the answers to those questions but also a place that had the potential to enhance our library and information technology experience. Australia, which is situated within the same region as Thailand, the Asia-Pacific, is advanced in high technology and also houses various kinds of university-industry initiatives, such as research parks and technology parks. Most importantly, the Australian government offers scholarships to Thai civil servants, selected by the Thai Government, who are working in various fields including the library profession, to come to Australia to continue their education. As a recipient of such a scholarship since 1994, I have undertaken a Ph.D. research which is entitled "A Model for a University Library which Provides Services to Tenant Companies in a Technology Park : the Australian Experience" at the Department of Information Studies, School of Social Sciences and Asian Languages, Curtin University of Technology, Perth, Western Australia.

The main objective of this research was to develop a suitable model for a Thai university library in information provision to tenant firms in the first Thai technology park. Such a model, which was based on Australian data, was fine-tuned to meet local Thai social and economic conditions. The research process investigated many issues with the tenants in five Australian technology parks. These included information needs, information use, information seeking-behaviour, information perception, librarians' roles, and characteristics of required information services, as well as evaluating the library information services which are already offered to the tenant firms by Australian university libraries.

The sample groups comprised both those in Australia and those in Thailand because it was considered to be very important that an investigation of the views of decision makers and librarians in Thailand was included in the research. It was not enough to impose Australian views and possibilities on Thailand, therefore it was decided that a small sample of Thai participants would be tested on the developed model. In Australia, there were three sub sample groups taken into account: company staff members in five Australian Technology Parks; the Technology Park Managers; and University Librarians and/or certain librarians in Australian University Libraries which have formal links with the technology parks. In Thailand, the sample group for a preliminary testing of a proposed model comprised top management personnel of one university whose technology park is in the process of establishment, and of three university libraries and one public organisation involved in information provision. The research methodology was structured interviews with checklist questionnaires.

4. Findings from the thesis

4.1 Profiles of the interviewees

Thirty-nine staff members of thirty-six companies, accounting for 23.37% of the total firms (154 companies, as in 1996), in five Australian technology parks were interviewed between April 26, 1996 and 5 October 1996. The other two sample groups were : five Technology Park Managers and four University Librarians and/or librarians-in-charge in four Australian university libraries, also interviewed during the same time.

The companies visited were high-technology based ****; engaged mostly in software development, and communication and telecommunication areas. Most were small- and medium-sized businesses with employee numbers ranging from 2-320. Their main activities were a mixture of research and manufacturing, providing some products to either end users or other companies.

Staff educational backgrounds varied from secondary level to doctorate level. However, most of the staff members interviewed (84.61% or 33 out of 39 people) held university qualifications. They were either owners of their own companies or senior personnel with titles, such as Managing Director, Research and Development Manager, and Marketing Manager.

4.2 Information needs

Findings on information needs of the respondents confirmed results of previous studies [10, 11] that tenants need not only a variety of business information but also technical information from different sources. Reasons given for needing the information were technical purposes, commercial purposes, competitive purposes, maintaining the business , and remaining current. In addition, the type of information mostly needed is how-to-do-it practical material rather than purely theoretical issues. Formal information obtained from professional bodies was considered of great value as was informal information obtained from commercial and other informal sources.

4.3 Information-seeking behaviour

These findings also confirm results from previous studies that the preferred channel for communication among company staff members is informal personal contact. However, the research has indicated a real difference between information-seeking behaviour of those working in R&D area and those not involved in active research or development. The results reveal that information acquisition process of 76.92% of the company staff members who worked in non R&D areas was in favour of doing it themselves first, and then seeking advice from other people around them, such as colleagues and friends. In contrast, 23.08% of the interviewees which included all R&D people, preferred to ask somebody else within the company, including librarians, to actually seek out the required information. That is, they clearly prefer an intermediary to be involved in their information searches. For example one R&D Manager whose company did not have library facility or librarian gave a view of the disadvantages of seeking information himself that :

> *"We generally do it [search for information] ourselves and that is unfortunate , because we spend a lot of time trying to get on to the information, storing it and accessing it. So, that area could be improved.... you can use the librarians and it can make far better use of your time."*

Overall results showed that clearly, there is a great potential for librarians to step into the tenant firms' information acquisition process to assist people engaged in R&D areas, particularly for those who would prefer librarian assistance.

Interviewees' perception of physically going to the host library to search for information was that it was difficult and time-consuming. They therefore preferred to have electronic access to the library catalogues via their own computers as they believed such immediate access would save time and effort and at the same time they could still continue with their scheduled work.

4.4 Information sources

The thesis results indicate that in running their business staff members used various types of information from various sources, such as their own collections, direct sources generating information, and from the Internet. They also preferred to use information sources which are situated physically close to them. The results found that the staff members used the Internet heavily even though they questioned the quality of information they received from the Internet, as one respondent stated: "... we do use Internet for research although we don't find it incredibly reliable..." In addition, the respondents regarded the Internet as an important source of information because they believed that the Internet provides quick and convenient access, current information, as well as savings in information seeking costs. Information obtained from the Internet was used to keep themselves up-to-date, gain general ideas in some topics, and to test hypothesises. Such results revealed that the information they received from the Internet was basic type of information that fulfils curiosity about Who Does What and When type questions. In contrast, in-depth and complex high quality information written by persons knowledgeable in those fields, and needed by R&D staff members is not taken from the Internet. As one respondent gave the view:

> *"... The Internet only gives the basic information either from companies or from databases, but in isolation. It's probably not enough and needs to be backed up by reference to local conditions, or people knowledgable about the subject as well..."*

Such high quality information is available in a library or companies' own information collections, providing that they had them. However, the thesis results indicated that half of the companies visited, particularly the smaller companies, did not have sufficient and well organised information collections to serve their information needs. Given such circumstances, the library definitely has a critical role to play in providing information services to the tenant firms.

4.5 Intermediary role

The results confirm that most of the company staff members (70%) do need help in finding required information in libraries, as they expected librarians to know where to get what information was available in the libraries. Responses also indicated that some interviewees did not need librarians as intermediaries on a regular basis. Some stated that they needed librarians only at the beginning stage of using the libraries and when they became familiar with the library systems, they felt that they may no longer require assistance of librarians. Some needed help on special issues, for example in information technology available in the libraries. On the other hand, 30% of the respondents stated that they did not at all need librarians to act as intermediaries for finding required information, due to their own preferences in doing searches for required information themselves, and for security reasons.

The research results also indicated that the librarian's role as mere intermediary is not sufficient to meet clients' needs particularly with the widespread use of information technology. In fact, respondents felt that librarians should perform monitoring services as well, that is, the library should provide other services related to the Internet, such as lists of web pages by subjects, current information on what is changing in the Internet environment, in effect, whatever may affect their business activities.

4.6 Characteristics of required information services

The interview results revealed that traditional library services, such as physical library access, and borrowing services were considered of little usefulness. Instead, there was a need for services that can present specific required information immediately. Additionally, respondents stipulated that content of the information was to be up-to-date and summarised before being presented to them. Electronic access to a library catalogue and other library services was recommended. Since not all the staff members knew how to search the Internet and use other information technology effectively, it was suggested that the library should provide training course on such topics, so that time and effort could be saved. In addition, courses on how to create web pages were also recommended, or even having web pages created for them (the clients).

4.7 Evaluation of the university libraries services

Of the five Australian Technology Parks visited, only three Technology Parks had formal links with universities. The thesis findings revealed that 80.76% of the interviewees were aware of library services available to them as one of many services offered by host universities via university-industry collaboration. Of the 80.76%, 47.61% had been informed of this through the Technology Parks, whereas only 9.52% stated that they knew about library services from the libraries themselves. Even though they were aware of such services, they were not aware of the full range of available services, in terms of, for example, what the services provided, what value they could receive from the services, who to contact and how to access them. In fact , the percentage of respondents using the host university libraries was only 38.46% and included as a whole those engaged in R&D areas. The other 61.54% stated that they did not use the libraries at all.

The findings also revealed that the rate of library usage of tenant staff members was related to the proximity of the library to the technology park. In addition, another reason considered by all R&D Managers for using the libraries was that the libraries had extensive collections with high quality information at low cost, the latter of particular interest for SMEs. On the other hand, three main reasons were given by the interviewees for not using the university libraries: firstly, going to libraries was inconvenient and time consuming; secondly, unavailability of relevant required information; and thirdly, there was no need for a library because all the information was made available to them by other means, without going to the library. It is pertinent to note the working environments of all the respondents who stated that they did not use libraries. All of them (16) who stated that they did not use the libraries were engaged in areas other than R&D, such as marketing, commercial and production. In addition, 18.75 % of them had formal in-house library facilities with their own librarians and 6.25 % had substantial in-house collections and also formally assigned one staff member to maintain those collections. The other 12.5% had parent and/or partner companies to fulfil their information needs without going elsewhere such as the libraries.

Responses from the interviewees also indicated that library awareness determines library usage. Responses from four out of five staff members who stated that they were not aware of any information services indicated that they did not use the library either. The thesis results also clearly show that business people were not fully aware of information services provided by host university libraries. It is therefore clear that the library should do more and better public relations on a regular basis, and the best channel recommended is via personal contact, follow by electronic. Relevant details of each service should be presented so that the businesses know what services are available, how they can be used to enhance their activities, who to contact, and the cost involved.

Experience from the Australian data pointed out many fundamental issues concerning library circumstances which could contribute to efficient information services being offered to tenants in a technology park. Consequently, before proposing a model for an academic library-technology park collaboration in Thailand, Thai university libraries circumstances were researched.

5. Circumstances of University Libraries in Thailand

(See also Diagram 1)

5.1 Current status of Thai academic libraries

Twenty four public university libraries around the country have already installed imported library integrated systems, supported by the Ministry of University Affairs under its two library development projects, dated 1995-1997. The two projects, namely PULINET (Provincial University Library Network) and THAILINET (Thai Library Network), aim to provide support in developing automated library systems in each member library. The second phase of this project which is due to be implemented from 1999 to 2001, will merge the two projects and form Thai Library Integrated System (Thai LIS). Thai LIS aims to develop a union catalogue among Thai university libraries, as well as develop full text and image databases of Thai research reports, theses and universities' archives [12]. In short, by the end of 2001, we are aiming to have a union catalogue which initially covers catalogues of the twenty-four university libraries.

5.2 Internet access

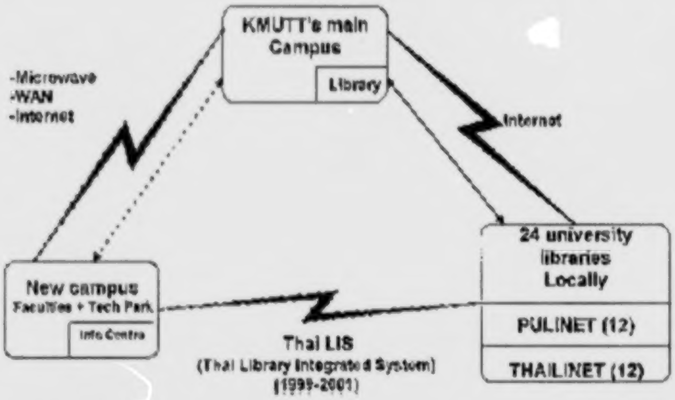
Information technology, including Internet facilities, has been booming in Thailand since the government declaration of 1995 as the national IT year, along with an approval of a national IT policy. As a consequence, a wide-range of national telecommunication infrastructure has been promoted and implemented. [13] Most organisations, either public or private, and including all of the twenty-four university libraries, have Internet access. Most of them have their own home pages in the WWW, and also provide access to their library catalogues via the web.

5.3 Resource sharing

Library resource sharing was formally initiated in Thailand when university libraries made an agreement for such needs in the 1970s, and following this agreement, bibliographic tools were developed manually, such as union catalogues and a union list of serials. Electronic library networking based on the resource sharing concept was introduced to a few Thai university libraries in the early 1990s and became widespread to cover many university libraries when Technical Information Access Centre (TIAC) was launched by the government in 1992. This centre has incorporated several inhouse databases, (which are mainly of a bibliographic type, developed by university libraries), into their host computer and provides on line access to its consortiums via Thaipak (a Thai packet switching network) and telephone lines. [14] As a consequence of Thailand's economic crisis budget cuts, including those of libraries, the resource sharing concept is being considered seriously (as against previously theoretically) by university libraries' executives. In order to manage the resource sharing exercise effectively, alliance libraries, sharing the same objectives and goals, need to establish policies, work procedures, and agreements which would bring mutual benefits. Effective resources sharing is one way to encourage Thai librarians to work closely and contribute to the promotion of creating the partnership concept as proposed in the model.

How KMUTT's library communicates with the new campus and other academic libraries is presented in Diagram 1. The infrastructure shows the potential of Thai academic libraries in offering electronic access for their clients, as proposed in the model.

Diagram 1 : KMUTT Library and Thai university libraries' current and future circumstances



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The process of developing an appropriate model for a Thai university library, based on Australian research data, required taking into account Thai university library circumstances, Thai economic, social and cultural conditions. To that end, the model was preliminarily tested on a small relevant sample group in Thailand and their comments and recommendations on the Australian practice as against what is appropriate or suitable for Thailand, are discussed below.

6. Australian practice and fine-tuning to meet Thai conditions

6.1 Library approaches and its location

Library facilities as well as other facilities of the host Australian universities were made available to all tenant firms of technology parks as incentives for Park occupancy. However, of the five Australian Technology Parks visited, only one is owned by a university and that Park is situated in the main, big campus, along with other university faculties. The campus library serves both its staff and students as well as tenant firms of the park. The other four technology parks, on the other hand, were not university-owned, but two have formal links with nearby universities. However, there is no branch or any other sort of library from the host university libraries physically situated on-site to provide services exclusively to tenant firms on the two technology parks.

In the case of Thailand, the university-owned technology park is in the process of establishment along with other faculties at the new KMUTT campus, which is about seventeen kilometres from the main campus. Obviously, the new campus needs its own library to serve clients on the campus. Consequently, the new library should be established as a new campus branch library of the university library. Such a branch library would be called an Information Centre in order to shift Thai clients' negative perceptions of a conservative library stereotype, that is, considering that a library is too old fashioned for innovative clients and entrepreneurs.

6.2 Library policy with tenant staff members

The thesis results indicated that tenants of the three Australian Technology Parks were not regarded as prime user groups of the host university libraries, therefore their rights and privileges in receiving library services were not the same as those of the university staff and students. The Technology Park tenants were regarded and treated the same way as other external corporate or community members. This may be a contributing reason for their little use of the library facilities. In the case of KMUTT, Thailand, its tenants in the first Thai Technology Park would be fully supported by the government incentives in various ways so as to enable them to concentrate on their work so that they could start new businesses. Additionally, such supports would be marketing tools to attract more businesses to move on to the Park. Since information is crucial in doing their work, tenants' rights and privileges in using the library facilities, unlike those in Australia, would be the same as those of the university staff members and students, encouraging them to use more library facilities and services. Such policy would be included in written form along with other library policies.

6.3 Library alliances

The Australian results revealed that of the three university libraries' information provision to tenants in the technology parks and other corporate members, there was only one library that had formerly had a formalised alliance with other libraries in providing such services, but had ceased because of insufficient budget. Apart from that, there was no evidence in the Australian results to show there was any formalised effort to join with other libraries in providing better services to this groups of clients in the technology parks. In Thailand, where budget, resources and manpower are limited, creating partnerships and sharing available resources with other libraries would be assumed as a prime library policy. We believe that such activities would alleviate these problems to some extent, and at the same time, encouraging each alliance to work more closely and give assistance to the ones in need, which would in turn contribute to improving and enhancing library activities.

6.4 Collection development

In the three Australian university libraries, their collections are shaped solely by their universities' curriculum. Library collections comprise various kinds of both printed and non-printed materials to serve their academic environment. Additionally, all libraries are fully computerised and equipped with efficient electronic network and telecommunication facilities. Electronic access to library materials and services are available to their staff members and students both via the OPAC and WWW. However, according to the respondents of the thesis research, the university libraries were considered to be full of materials on theory but lacking practical and how-to-do-it information. Also they felt information on business-related issues, such as company information, market and marketing information, and price list of certain products were not found in the university libraries. In Thailand, collections of the Information Centre should therefore include not only technical-related but also business-related issues as well as 'how-to-do-it' matters, shaped not only by the university curriculum, but by tenant companies' main activities. Tenants would be allowed to recommend library materials and other services they required.

6.5 Fee-based services

The thesis revealed that all the three Australian University libraries with formal links with the three Technology Parks, offered various kinds of services to the tenants, both free-of-charge and fee-based ones. Charging for the services included not only actual cost for the services but also library staff time, which increases the cost. The cost structure for the tenants is at the same rate as those of other corporate members. No subsidies were provided by the universities in the information searches. Thus the results indicated that high cost in information searches was a contentious issue for some companies, particularly SMEs, in making use of the services

In the case of Thailand, Technology Park establishment is a government mechanism to assist SMEs in creating home-based technology. Consequently, some cost for library value-added services would be subsidised by the government through the university. We believe that this would encourage the tenants to use more information to enhance their business activities. The fee structure is based on the potential for payment by the clients, by considering whether or not the tenants were start-up business or R&D sections of big companies.

6.6 Staffing

Australian experience indicated that certain qualified librarians could provide better services to the business community. Such librarians should have background knowledge on both technical and business-related issues as well as being computer literate. In addition, they should be service-minded, have good communication skills and out-going personalities as well as commitment to providing such services. In Thailand, however, it is very difficult to find those sorts of qualifications and personality in a single librarian at the moment. Particularly lacking at present are those with technical and business background knowledge, since nearly all of the Thai librarians have an arts/humanities background. Additionally, their service-mindedness, client-focus, out-going personality as well as computer-literacy are also not easy to develop due to both personal and Thai cultural reasons, particularly in the case of senior personnel. Thus, these areas need to be seriously emphasised and promoted in our personnel development programmes as well as library studies curriculum.

7. A proposed model for the KMUTT library in the provision of information services to tenants in its university-owned technology park

(See also Diagram 2)

Experience from my research and previous relevant studies overseas indicate that a university library has a critical role to play in information provision to tenants in a technology park. There are definitely information needs which cannot be satisfied through the Internet in its present form, particularly in the R&D area which is of particular importance to Thailand. How such information services could be implemented in Thailand was researched and fine tuned to coincide specifically to Thai conditions and circumstances as discussed in 6.1 to 6.6. Presented below is the model for five major library activities, namely, policies, collection development, information services, staffing, and promotion and marketing.

7.1 Library policies and approaches

7.1.1 A new branch library should be established as a campus library which serves not only its staff members and students but also tenants of the Park. A physical presence on the park is vital to facilitate the provision of services and personal contact which is the major communication channel among the business community. The branch library should also be included as part of the technology park's infrastructure. Such a library would be called an Information Centre in order to shift clients' perceptions from the conservative library stereotype. In effect, service quality concepts should be adapted and incorporate into the Centre's policy, such as the concept of libraries being in competitive business and providing whatever it is expected by customers. [15]

7.1.2 The Information Centre should have some degree of autonomy between itself and the main library so as to enable the Centre to provide more effective services to its potential clients. Additionally, the Centre should focus on provision of services rather than collection management and technical services.

7.1.3 As it is clearly impossible for one library to house every kind of information, it is recommended that the university library should seek cooperation with other libraries, either university or special libraries, both locally and abroad, which house relevant information. Such collaboration should bring about mutual benefits. Resource sharing through collection development, interlibrary loan and document delivery should be put into practice rather than on paper.

7.1.4 The information centre should be electronically based with high quality and speed of services, equipped with electronic network and communication facilities to other buildings within and outside the campus. It should also perform as a gateway of the campus to access to other information sources both locally and internationally.

7.1.5 Since information provision to tenants in a technology park is quite new in the Thai academic library environment, the Centre should carry out appraisal processes on a regular basis in order to fine-tune its performances. The outcome of such activities should be appropriate action taken, with clients being informed of any changes.

7.2 Collection Development

Its collections should include not only technical-related but also business-related issues as well as 'how-to-do-it' matters shaped by both university curriculum and tenant companies' main activities. Information in electronic format rather than printed format should be emphasised to meet changes in information-seeking behaviour pattern of the clients.

7.3 Information services

Information services proposed to the target clients should include current awareness, document delivery, on line searching and training services as well as basic types of library services, such as library access and quick reference services. The value-added services would be charged at a minimum rate with some subsidies from the parent university so as to encourage the tenants to use more information in their business. The fee structure should be based on the potential for payment of the clients.

7.4 Staffing

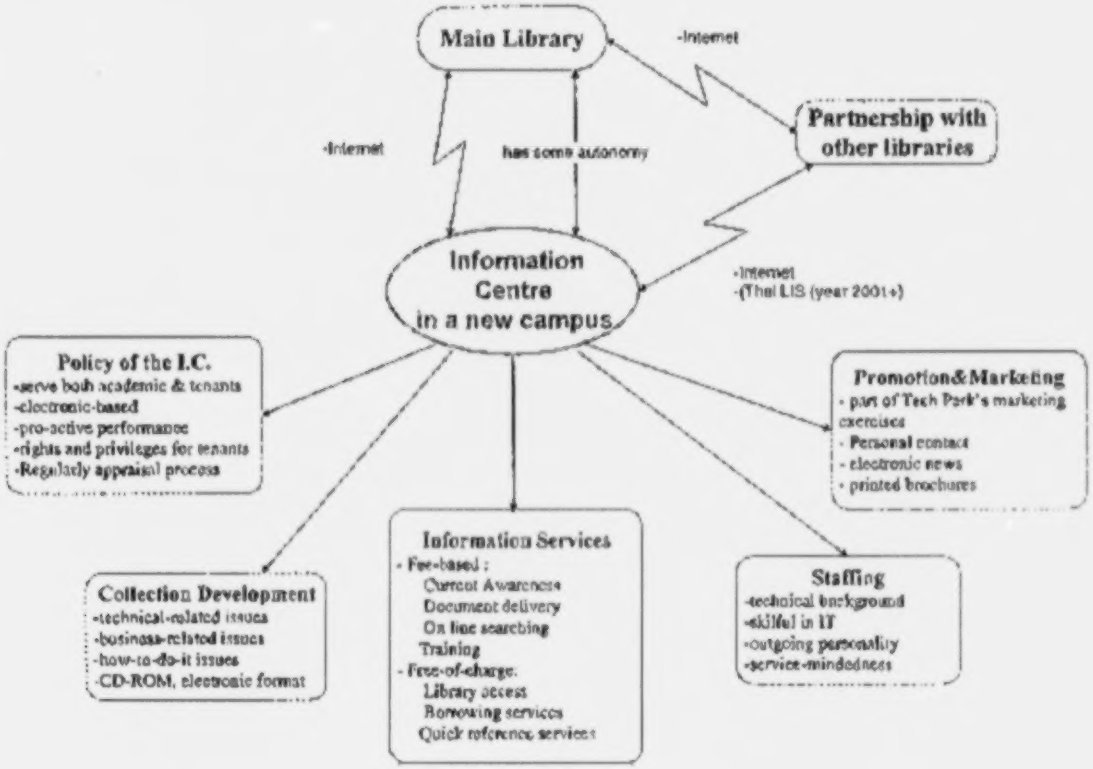
Staffing in the proposed information centre is to include at least one professionally qualified librarian, with up-to-date business awareness as well as client-focus, to take full responsibility in providing such services to the tenants. He/She should have background knowledge on both technical-and business-related areas as well as be computer literate. In addition, the librarian should have good communication skills and an outgoing personality as well as commitment and motivation in providing such services.

7.5 Promotion and marketing

Promotion and marketing exercises of the centre should be undertaken seriously because library awareness determines usage. Such exercises should be incorporated in the activities of the university and the technology park. Additionally, the centre should also do its own promotion to inform the clients as to what services the centre would provide, what value the clients can get from those services, whom to contact in the Centre and how, and the costs involved. The best way to promote the centre is via personal contact and electronically, which should be carried out on a regular basis. Moreover, the centre should keep the clients informed of what is happening in the information centre either by e-mail facility or other publicity materials, such as pamphlets and brochures.

All recommendations are also presented in Diagram 2 :

Diagram 2 : A Proposed model for a university library in Thailand



8. Conclusion

The library activities outlined above present new endeavours for us as Thai university librarians to step beyond traditional library boundaries. The proposed model provides substantial guidelines for librarians to direct library involvement with group of dynamic clients. It is clear that libraries and librarians can form part of the many critical mechanisms that support national industrial development by providing relevant information to meet clients' needs. We have an exciting journey to make and challenges to overcome on the way. Whether and how effectively we arrive at the desired destination depends on our motivation, energy, positive attitudes towards the library profession, and willingness to adapt to our

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rapidly changing world. To conclude this paper, I would like to quote I.G. Dalton [16], Director of Heriot-Watt University Research Park who, at the International Association of Science Parks Asia-Pacific Regional Meeting in Bangkok in 1993, stated that:

> *"... it is people and their knowledge which contribute to the wealth of a nation, and mechanisms which help to create and share that knowledge base must be of value in any economy, whether regional or national. "*

Notes

*) Since this paper is based on my Ph.D thesis, the term technology park is used throughout the paper

**) The initial project was called Industrial Park.

***) The former name of this university prior to 7th March 1998 was "King Mongkut's Institute of Technology

****) According to Baruch 9, high technology organisations (HTOs) are companies which have **1)** the existence of internal research and development as a significant share of the organisational operations. **2)** A mix of human resources (high proportion of academic and professional staff) as part of the organisation's employees. **3)** Area of activity is advanced technology, on the cutting edge of technology development. It is widely agreed that leading technologies are in the fields of micro-electronics, biotechnology, artificial intelligence, electronics, computers, pharmaceuticals, alternative energy, advanced weapon system, IT enterprise , software, etc.Thonburi (KMITT)"

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Back to contents

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EVERY TIME I FIGURE OUT WHERE IT'S AT, SOMEBODY MOVES IT!

Eugenie Prime
(Manager: Corporate Libraries, Hewlett-Packard)

It is wonderful to be back in South Africa. It's getting to be one of my favorite destinations. And it is always good to be among my fellow professionals. Actually, yesterday a few people asked me, Which university are your from? So, you may well ask what is a nice, innocent corporate librarian doing in a place like this, with hundreds of politically savvy, sophisticated university librarians. Well, let me tell you. There is really much more that unites us in common concern than divides us in mission of focus. I would like to spend a time this afternoon talking about a situational content and probably why we got where we are and to make some suggestions of how we can get ourselves out of there. You know, we are living in incredible times, -incredible times of change. We are living in a time that John Handy in his book "Age of Unreason" describes as discontinuous change, where he says the only thing that is predictable is that nothing is predictable. We are living in age that having created Moore's law, promulgated in 1965, thirty three years ago we are now turning around and threatening to defy Moore's law. Now Moore's law predicted a linear extrapolation of double density chips every eighteen months, and in 1997 processor speed, storage capacity and transmission rates involved at an annual rate of 60%. In the last decade things have been improved a 100 times.

Yes, this is an age in which the computer in a watch on your hand and the computer games your grand kids play, have more power than the first IBM 360. So it is an age that is not only terrifying in the kind of change and the nature change but dizzying in the speed of change. One person said that the factory of the future will have two employees a man and a dog. The man would be there to feed the dog and the dog would be there to keep the man from touching the equipment. Microsoft in a first page ad in Business Week just a week ago asked this question "Are you living under the threat of change, or are you living in hope of it?" This change is also an all enveloping change. It is an change that affects how we work, play, entertain ourselves and educate ourselves. It is a change that affects how we interact with each other. We live in an information age where most new products are old products that have been informated. In this book 20/20 Vision, the author Stan Davis talks about a Japanese manufacturer Toto Ltd who sells a paperless toilet, that sprays warm water, blows warm air to dry and even dispenses scent. More than that, the machine keeps the seat warm in winter and automatically sanitizes the bowl after each use. New models analysis urine, measure body temperature, weight, blood pressure and pulse. Now you can imagine anybody who is a hypochondriac having a wonderful time. It would be a hard to get them out of the restroom. In short, and I quote Davis, "Today information based enhancement have become the main avenue to revitalized mature businesses and to transform them into new ones". We also living in a economy that has been called the information economy. An age where information is perceived as the new capital, perceived as the engine that generates wealth. Words such as Intellectual capital, and Knowledge Management are becoming as common in the corporate arena as Return on Investment. An economy where people are wrestling with how to measure these knew intangibles. We are recognizing the truth of a statement of ... Einstein ... in a truth that we all as librarians resonate with. Einstein said "Not everything that can be counted, counts and that not everything that counts can be counted". Every year at budget time when we need to justify the need for dollars for collection development because of increases in the cost of serials of electronic texts the need for more staff and additional equipment and more meaningful space and the powers that be want justification in simple dollars and cents or in raw numbers, thank you. We often wish for the wisdom of Einstein. Well here it is, distilled and crystallized not everything that counts can be counted and not everything that can be counted counts. But we keep looking for that magic formula the silver bullet algorithm that will put us just in the place to always guarantee us the sufficient funds that we need. And I am here to tell you that that does not work. I have been there, done that. Because the day the it works, the day after, somebody will change the rules.

What has and continues to intrigue me most, is that in the age of information where we talk about a knowledge creating company, where we talk about a new organizational wealth as knowledge or information. What intrigues me most, is that this wealth has seemed to bypass our institutions that - is libraries, and eludes us as information professionals, that is librarians. I am yet to see the librarian, that has struck gold and made it rich. I am yet to see the Bill Gates of our profession. And all reason and logic and good sense seem to say this should not be so. What has happened instead, in this age of information and information economy, we the natural heirs, we the natural heirs are here at this conference, with this theme of the challenge of relevance for the 21st century. What is wrong with this picture?

Let me say unequivocally that I do have a lot of respect for the planners of the conference programme and for the theme chosen. Despite the abstract that does appear in print and I did write it I confess, the issue of irrelevancy, the fear of irrelevancy, the fear of becoming beside the point, the concern about being discounted and marginalized, the fear of being considered extraneous, is a valid one and one that does need to be addressed. And this is perhaps as good a place as any which to engaged in such a discussion. If not here among professionals then where? After all we are told that if ten years from now our business remains the same as today we would very likely be out of business. Having said that, let me restate a point that I made in my abstract, and let me restated as unequivocally and as bluntly, and that point is this that the answer to our concern with relevancy is not to be found in seeking after relevancy. Relevancy you see can not be the goal of target, relevancy can only be a by product. Let me repeat that, relevancy can not be the target, it can only be and it must be a by product. When we claim that we want to be relevant, what do we mean? Relevant to whom and relevant to what? Relevant to faculty, students, or both? Relevant in the minds and perceptions of our economic buyers, rectors, chancellors, provosts, presidents? Relevant to our vendors and suppliers? And relevant for what? For what we have always been? To do what we have always done? And who determines our relevance? We, are the organization or people for whom we wish to be relevant? Relevance you see is relative.

The other issue is, that in order to be relevant, if that were truly possible as an end state, we would always have to be testing the pulse, checking the temperature, reading the vital signs and then setting a course of action guaranteed to get us there we hope. But once we get there, we will only find that there is no longer any there, there, because you see, every time you figure out where it's at, somebody moves it. Our environments are too volatile. Change too discontinuous. Expectations too fragile, technological breakthroughs too unpredictable for us to keep checking on vital signs as a precursor to action. The late Will Rogers the well known American cowboy -humorist speaking in the 1930's, said this "it is not sufficient that you be on the right track, if you are not moving fast enough, you will be run over." The trouble is, there is a mischievous engineer called Change, who keeps switching the tracks capriciously or so it seems. He has a devilish sense of humor.

Think about this for a moment, twenty years ago, 15 years ago, 10 years ago irrelevancy was not an issue a matter of fact, as a medical librarian and as an corporate librarian, I envied academic librarians. You guys seemed to have it made. I mean everybody understood that universities could not exist without a libraries, and you were a part of the accreditation process. So, if the library is the heart of the organization, the heart of the organism, how can you get rid of the heart without getting rid of the organism. So it seemed to me you had it made. So can you imagine my shock when you are talking about relevancy. So what has happened in the last 5 years or so to bring about this issue. Well a number of things for starters;- Disintermediation, Ceding of professional territory, seduction of technology and the internet, the demystifying of our jobs. This list is not supposed to be all inclusive. I am just mentioning some of these things. Disintermediation. When people wanted information they came to us the information specialists. Now they specialize in finding the information themselves. They have even coined the word for it, it is called disintermediation. And that is for us a dirty, four letter word, because we were and are considered intermediaries. Now they not only say that we are irrelevant and unnecessary. They say that we are barriers to access. Now we may dispute that, but the issue is not whether that is true of not. The issue is and the fact is, that they believe it. They think that they can do it them selves, faster, better, cheaper. Think of the old information delivery system, and think of it in terms of a manufacturing process, think of the supply chain management. In the supply chain, the pay off takes place only at the end of the chain. In our terms that is when the information is received or delivered in a form that the user can use or, in a form that is actionable. Supply chain optimization argues, that at every stage, one wants to guarantee the minimum amount of redundancy, eliminate any unnecessary form of interaction, that might impede the information flow or lengthen the cycle time from production to consumption. The idea, is that the information must be there just in time not just incase, not one moment before, not one moment after. Unfortunately we are often perceived as impeding that smooth flow, not only by the users but often times by the suppliers themselves who now have the technology to deliver the information directly to our clientele. Just think of the computer manufacturer "Dell" and how Michael Dell transformed the sale of computers by allowing the customer to choose features on the web and custom fit the product to meet his unique and specific needs and by the push of a button actually start the assembly process that ends with a huge payoff - the computer he wants in just two or three days, think about that. We've got to think of creative ways to reengineer the information delivery chain.

Think about the internet. It has captured the imagination of so many, and the world wide web, that has forever altered what we do in so many ways. Just last Monday I heard the CEO of Dialog, Dan Wagner say, that Dialog is 50 times the size of the internet. Did you know that? 50 times the size of the internet. An incredible figure, but who cares? Who cares, if you cannot access Dialog as easily and as quickly and as readily as you can the internet? And as cheaply. That is right. But then the providers, who have been trying to provide information directly to our customers, have found that it is not so easy as it at first appears. They found that the more information they provided, the more complex the problems became. They needed to organize it for access and retrieval. Aha, we said, they need us. At least they need a cataloguer. But then they took our skills and coined the more sophisticated and sexy word and called it meta data. That sounds more exciting that cataloguing. We simply called it descriptive cataloguing. By-passed again. To name it is to own it.

And then there is this vocabulary that we call by the sassy names thesaurus or thesauri or we talk about authority control. And I wonder what they will call it. You see, for the most part, we have sat passively by as witnesses to the action, accessories to the crime and as reactionaries, while imperceptibly but inexorably we have ceded professional territory, bit by bit. Yesterday, meta data, today thesaurus, tomorrow what? We have watched them create a new game, with new rules and then wondered why don't they let us play?

There is no doubt about it, technology seduces. It seduces even us. So much so, that we often turn to it as the answer when it is itself the question. It is easier for management to expend resources on technology rather than on content, because there is something reassuring about its tangibility its bulk that makes it easy to justify the decision making process. On the other hand, we tend to be associated with old technology, PRINT.

Then think about the demystifying of our jobs. You know, all professions like to maintain some mystery, some information that is hidden from the uninitiated and for us it was the searching of the online databases. The arcane search protocols of the online databases, like Dialog. On the internet, any one is able to search and retrieve. No special skills are needed. This has led many to believe that anything and everything they need is available on the net and that it is available for free. The result is that we are faced as a profession with the issue of an identity crisis \endash who are we? And why are we here? And how long are we going to be here? I am here to tell you, that it would never be the same again; And you know, that is not such a bad thing. We always stand ready to doubt ourselves. We glorify the past and so we wonder if our glory days are over. The truth is that our glory days may still be ahead of us.

I would like to suggest some things, some actions, but more, some changes in attitude, some ways of thinking about the things around us and the circumstances around us, that hopefully will indeed bring glory days to us.

The first thing I want to talk about is the creating of a shared vision. Someone has said "there is no freeway to the future, no paved highway from here to tomorrow. There is only wilderness. Uncertain terrain. There are no roadmaps. No signposts. So pioneering leaders rely on a compass and a dream." A dream, that is what a vision is. Yesterday, I was met at the airport by Ian and I later found out from Ria, that he is her son. We were chatting and he was telling me that he has this dream of visiting the United States and we began to talk about places that he would like to visit, and one of the places he wants to visit is Disney World. How many of you have visited Disney World? Quite a number of you. How many of you have a dream to visit Disney World? I have not visited Disney World, and it's not my dream. Think about Disney World. The story is told that at the opening of Disney World all the high mucky mucks or the executives, the top people, were there talking chatting. Somebody said to the president of Disney company, You know it is a pity that Walt Disney isn't here. It is a pity that he did not live to see this. And the guy looked at him and said but he did see it. This is why it's here! And that is what a vision is all about. Your ability to see what your library is going to be like tomorrow. That is the only way that it is going to exist tomorrow. You see, when people start talking about strategic thinking and strategic planning it is not about forecasting the future, it is not about planning what you will do tomorrow, it is about the futurity of today's decisions. You can't get there from here you can only get here from there.

So a dream is simply a picture in your mind's eye. A mental image of what your library will be like. We are told that everything is created twice, first in the mind and then in reality.

The qualities of a vision must be that it is lofty so that it inspires and it captures your imagination. It needs to be compelling and it needs to be seductive. The vision becomes the lens through which we see and it effects what we see. It helps to shape the decisions we make \endash the opportunities we grasp and exploit. It becomes the primary criterion for making decisions. I remember some years ago when we had the vision for a virtual library this was about 1991 and we started the library as a project. And two years later in December of 1993 I was first introduced to Mosaic immediately I saw Mosaic I knew exactly how the vision was going to come true. Having that vision there provided a lens through which I could see Mosaic, so that Mosaic was no longer just a simple fancy tool, it was a tool that was going to get me where it is I wanted to go. You see, things do not just happen. We make them happen by what we do or what we fail to do. The vision is an evolving dynamic vision because we are creating this vision in an age of turbulence, in an age of uncertainty, in an age of change and in an age of innovation. It is important that as you create this vision you involve your stakeholders and you want not just involvement from them, but you also want commitment. You know the difference between involvement and commitment, don't you? You know the story about the pig and the chicken? They both overheard somebody talking about bacon and eggs. And the hen clucked but the pig looked very sad. And the hen said to the pig, why are you sad? And the pig said, "look, you're only involved. I am committed."

Dr. Arlene Blum has led 15 expeditions to Anapurnia, the tenth highest mountain in the world. What is unusual about this woman is that she led these expeditions with women only. She talked about the first time she tried to lead this expedition nobody believed it could be done. She had a hard time raising the money to do it. The women themselves were not sure that they could do it. But this is what she found out. She said, "I learned that a group of ordinary people when they share a vision can take on a incredible challenge and do things they never dreamed possible." This morning we spoke about challenges, and we think we are ordinary people but we are capable of doing incredible things once we have a vision.

Values

Now we are in the value delivery business or let us put it this way, you should be delivering value. We should be asking ourselves; How do we add value in a way that nobody else does or could? Value is in the eye of the customer or economic buyer. The customer decides whether we are adding value or not. Value may mean different things to different people, and different segments of our customers. We talk about price/value, ratio. This is what allows some products to be sold at a price that is higher than the competitive products and still do it successfully. The price/value ratio and don't fool ourselves to thinking that we offer anything for free. You may not charge a dollar price but somebody is paying something \endash maybe their time or something else. You can ask yourselves how can I add value to my web page that will make people want to go there first rather than to the Internet? Is it because of reliability? Is it because I have selected and customized it? Is it because it is interactive? Is it because I offer a chat room where people can meet people of similar interest? Is it because it is easy to navigate? Is it because I have anticipated people's needs before they even recognized it themselves? Is it because my web page delivers over and over again! How can I add value? People will pay for value \endash not just content \endash but the value they place on the content.

Shared Values

The other point is Shared values, and I am thinking of value in a different sense now. If we think that we undergoing a crisis of confidence, just think about the people who work for us - the people who report to us. It's even worse for them. It is important then that we understand what our competencies are. What is it that we bring to the table that is unique in its contribution? Unique in its perspective. And as we understand this we share a sense of what our values are. What we value as an organization and we should articulate it with consistency and we should act it out with congruency. We have to make sure that these values cascade down the organization. We need to truly create an environment that empowers our staff to take risks. We need to create a climate where it is safe to take risks. Risks without danger. We need to get people engaged. We need to get people passionate about what they do. The law of thermodynamic, says that we need energy to move inertia and that energy needs to come from within and that energy is passion. There is a coach, a baseball coach I think it was, in the U.S. who said about his team, that he wanted his people fired with enthusiasm or they will be fired with enthusiasm.

Forge strategic alliances

We need to forge these alliances with our vendors and suppliers. You know it is easy to consider them the enemy but that is pointless. Although, I must admit that they do make themselves an easy target. We need to forge strategic alliances with our stakeholders, faculty members, chancellors, and deans. We need to forge strategic alliances with external organizations. You are looking for a win/win. This morning, one of the speakers spoke about GAELIC that is an alliance of University partners of sorts. Creating and managing alliances is an unnatural act. It does not come easily. Essential to its success are trust, credibility and commitment. We can transform our capabilities through alliances. Extend our reach through alliances. We can do things together that we are incapable of doing singly. Let us forge strategic alliances.

Make Burgers With Our Sacred Cows

Robert Kriegel wrote a book titled "Sacred cows make the best burgers." This is also the same guy who wrote the book "If it ain't broke break it." We have to reach the place where we realize that with limited resources we have a need to reallocate these resources to make sure that we are getting the best buck for our money the best value for our buck. We have to make sure that we reallocate those resources to places where we can get the most value, so we need to add new words to our vocabulary words such like; planned obsolescence, words such like; cannibalization. You cannibalize the very services or products that you created. We have to forget those things that we have always done no matter how much we enjoyed doing them. We will find value not from the things that we give up; we will find value from the things that we take up. Now this is not easy, particularly for those who work for us, but we have got to challenge every assumption. Challenge your existing portfolio. Put every product, every service to the test. Consider markets that you never considered before. Nothing is sacred. We have to do some different things and we have to do some things differently. Sacred cows - make the best burgers.

Respond with Flexibility

We have to respond with flexibility. In an age of speed, and in an age of uncertainty the only valuable response is Flexibility. All our organizations need to be supple, ready to respond to change. We need quick reflexes. We need to be very sensitive, very responsive to our environment. We need to be open to new ways of thinking. The operative word is the word new. The world is changing. There is absolutely no way that yesterday's answers could suffice, for today's questions or tomorrow's questions. Maxim Gorky said, "that in the carriages of the past you can not go anywhere. We need to rethink, redefine, reconceptualize what it is we are all about. And this rethinking, this redefinition, this reconceptualization must be ongoing. It must be dynamic. And it must be continuous. Discontinuous change calls for discontinuous or upside down thinking. Progress, says George Bernard Shaw is made by the unreasonable man. We have to begin to think unreasonably. I wrote down some thoughts about things you can do that are discontinuous. Why not keep our libraries open twenty-four-by-seven? Why not? And you say, well with a virtual library it is open twenty-four-by-seven and I respond, well not really. Information is available twenty four by seven but if we say that we are the critical factors in the library, not just the information needs to be available. Why aren't we available twenty four by seven? And you can do it from home. You don't have to be in the library and the technology supports it. When people are stumped searching the internet or searching your web page then they can press a button that says call the librarian. The face shows up and you answer the problem. Why don't we offer consulting services outside the library? Now to none of these questions should you say we can't do it.

Consulting services even outside the library, outside our campuses using our core competencies. Why can't we create new and exciting information products that are sold in the market place? Why don't we hold patents for search engines? For filters? If somebody is going to do it and someone is, why not us? Other departments in the university have people who have patents isn't that so? And they consult outside don't they? Why can't we out out yahoo, yahoo? We know our customers. We don't want to offer just any alternative, but a packaged customized service product.

Let's rethink our physical structures. I think the library, as a place is a metaphor that still has some viability, so why can't we have internet cafes for students? Why can't we have physical chat rooms, with fireplaces? Why can't we simply restructure our physical structures to suit our changing paradigm?

In this new and different world we need to make bold decisions, and we need to do this on the \par basis of less analysis and less information than we have grown accustomed to or feel \par comfortable with. But that is the new and different world. If every time, I figure out where it's at, somebody moves it! How do I survive? How do you survive? How do we survive? What is the key? What is the answer? The answer is this, and please listen carefully, the answer is simply this, I have got to be the somebody who moves it. You have got to be the somebody who moves it. Instead of figuring out where it's at, you are now deciding where it's at. You may do that through your compelling visions and through your exciting value propositions, through your creative alliances and networks, through recognition of your core competencies, through responding with flexibility, through challenging your assumptions, through your openness to new ways of thinking but make no doubt about it that is the only answer to the challenge of relevance. When you determine the game and the name of the game. When you set the rules of the competition; when you create change rather than react to change; the challenge of relevance becomes a moot issue. It simply becomes irrelevant. The question and challenge was yours. You posed it, the answer lies with you. This is your moment. This is your time. This is your moment, Act now. Thank you.

Thank you.

IATUL

MALAYSIA'S MULTIMEDIA SUPER CORRIDOR AND ROLES OF INFORMATION PROFESSIONALS

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Introduction

With the convergence of computer technology and telecommunication, governments world-wide are devoting increased resources to the development of their information technology (IT) and multimedia industry as one of the central forces for future economical growth. Governments are orienting their development toward technological-intensive industries and higher value-added activities. They are implementing smart city mega-projects to attract and nurture top international companies' investment.

Currently, there are many smart city mega-projects being planned throughout the world. They are designed to implement economic revitalisation measures to cope with the ever intensifying inter-regional competition of the world. Mega-projects are funded by private industries, national and state governments as well as international investors.

Based in Japan, the Super Regions of the World project used primary and secondary research approaches to identify over two dozen smart city projects. Some mega-projects in Asia are Malaysia's Multimedia Super Corridor, Singapore's Singapore One, Philippine's Subic Bay Freeport, Taiwan's HsinChu Science Park, and India's Bangalore Information Technology Park.

In Malaysia, the Government is supporting the diffusion of Internet and spearheading an ambitious project to bring Malaysia into the information age. The project is the design of a smart city called the Multimedia Super Corridor (MSC). The MSC is being planned as a high-technology centre where world-class multimedia companies can develop state-of-the-art products and services. Since Malaysia is undergoing a change from an industrial to information age, the MSC will guide the country in identifying how to use multimedia services in an efficient and competitive manner. It will serve as a springboard for regional and global multimedia markets.

This article uses Malaysia as a case study to describe some challenges associated with the development of smart city mega-projects and to analyse the implications for librarians and information professionals. The underlying questions are first, why is the MSC important to Malaysia's national development, and second, what roles do librarians and information professionals play in the successful implementation of smart city projects. In other words, how can librarians support smart city developments that will require information and technological literate workforces?

The Multimedia Super Corridor (MSC)

Malaysia is a multi-racial country located in Southeast Asia, bordering Indonesia and the South China Sea. Figures from the Statistics Department of Malaysia indicate that the household incomes of Malaysians have gone up annually by between 6 and 10 per cent over a seven-year period (1). They show that families in urban areas such as Kuala Lumpur enjoyed higher increases in income growth than those families in rural areas. This has contributed to the higher level of education among people in towns, and better opportunities for employment.

Malaysia is a nation whose growth has been shaped by several strategic five-year development plans. The Vision 2020 Plan, a national agenda, provides specific goals and objectives for long-term development. One of the major challenges of the plan is for Malaysia to become a fully-developed, matured and knowledge-rich society by the year 2020. But like other countries in Asia, Malaysia is facing declining competitiveness in manufacturing, skilled labour shortages and an increasing cost of labour.

Therefore as a strategy to achieve Vision 2020, the nation has embarked on an innovative plan to leapfrog into the information age by creating the MSC, a vehicle for attracting world-class technology companies and developing local industries. The MSC is the brainchild of Malaysia's Prime Minister Dr. Mahathir Mohamad. It is planned as a smart city spanning an area 15 kilometres wide and 50 kilometres long, encompassing the Kuala Lumpur City Centre (KLCC) and the new Kuala Lumpur International Airport (KLIA). As a high-tech centre, it is attracting world-class corporations from around the world to set up their business units and R&D facilities.

According to the Multimedia Development Corporation Executive Chairman Tan Sri Dr. Othman Yeop Abdullah, 103 companies such as Sun Microsystems have been awarded MSC status. The Multimedia Development Corporation (MDC) is the one-stop agency created to facilitate the planning and implementation of the MSC.

Of the 103 companies which received MSC status, 37 are Malaysian companies; 28 are joint ventures between local and international companies; 12 are from Europe; 9 are from the US; 5 are from Japan; 1 is from Canada; and 11 are others (2). The MSC status companies are provided financial incentives and a Bill of Guarantees. Under the Bill of Guarantees, the Government of Malaysia commits to providing a world-class physical and information infrastructure; unrestricted employment of foreign knowledge workers, competitive financial incentives such as no income tax for up to ten years, and a one-stop agency to handle all MSC queries.

The MSC is particularly attractive for international and Malaysian companies that develop or use multimedia technologies to provide value-added services, that consider expansion to Asian markets a strategic priority, that are prepared to contribute to the creation and development of any of the seven Flagship Applications, that are willing to take advantage of the MSC's high-performance infrastructure and ground-breaking cyberlaws, and that are interested in helping to shape a new development model for Asia's Information Age (3).

Global Diffusion of MSC - Role of Librarians

As the MSC is being discussed within Malaysia, librarians have conducted research to identify relevant overseas websites and to measure the international interest. One study uses a new methodology called web linkage analysis. The online linkage analysis is a diffusion approach using web search engines to analyse the current level of interest in an emerging topic. The results of the linkage analysis were sent to managers at the Multimedia Development Corporation (MDC). The one-stop agency for MSC planning and implementation.

The online linkage analysis was conducted using the fragment field search capabilities of the Alta Vista search engine. In Koehler's (4) article on specialised retrieval, he describes fragment search as the capability of searching fields within the HTML source code. In Alta Vista, different fields can be searched such as those listed in Table 1.

Table 1 - Field Search in Alta Vista Search Engine (www.altavista.digital.com)

Information	Field Name	Sample Search Statement
Website address	url	url:www.whitehouse.gov (Locate the website with this specific address)
Specific country	domain	domain:my (Locate all websites on in-country servers in Malaysia. The two-letter country code is from the ISO 3166.)
Website that has a hypertext link to specific website address	link	link:www.mdc.com.my (Locate all websites that have hypertext link to the web address www.mdc.com.my)

Linkage analysis provides the capability to identify what websites have hypertext links to a specified site such as www.mdc.com.my (MDC's website). The retrieval results provide a list of websites that are linked to www.mdc.com.my. The linkage data is used as an indicator of which foreign organisations or individuals want to keep up with the latest developments about the MSC. It indicates a level of current interest in the MSC. To analyse the interest, the websites must be examined.

For example, using the Alta Vista search engine, a search was conducted for websites that are linked to the MDC's homepage (www.mdc.com.my). Using the search statement link:www.mdc.com.my -domain:my retrieved the websites for foreign organisations or individuals who have a hypertext link to the MDC such as the Muslim Brothers Chambers of North America (www.mbcna.org/links.htm). The "-domain:my" is used to eliminate retrieval of websites that are on in-country servers in Malaysia. In November 1997, the search resulted in 1479 hits (websites) but only 282 sites could be accessed for analysis. (Regarding the problem of displaying all 1479 hits, the Alta Vista's webmaster was contacted and responded that there is a technical problem in displaying all of the results.)

Table 2 identifies the type and location of overseas organisations that link to MDC's website. With about 14,000 Malaysian students studying in US institutions of higher learning, this impacted on the number of US based websites that linked to the MDC's website. Since many US universities provide free Internet access and homepages for students, some Malaysian students' homepages provide links to the MDC. Additionally, US commercial organisations that provide free homepages such as Geocities have many Malaysians who provide links to the MDC. Malaysians are active in describing and diffusing the MSC concept overseas.

Table 3 summarises some results of the linkage analysis. It indicates that several governments are conducting smart city research which includes the MSC. For example, Australia's Department of Trade and Industry commissioned a benchmarking study to analyse how five countries (Singapore, Malaysia, UK, Ireland and Israel) pursue strategies that aim to foster development of their information industries. It provides a comparative analysis of the nations' experiences in the areas of smart city developments, venture capital, tax concessions, support for R&D, and educational training. It compares two smart city projects: Singapore's Singapore One and the MSC. In the US, The Trade and Development Agency commissioned a study on the MSC to identify opportunities and outline strategies for American investors.

Organisations have also established new consortia to monitor smart city developments. The consortia include Super Regions of the World (Japan), ANCARA (Netherlands), and the Global Information Infrastructure Commission under the auspices of the Institute of Strategic Studies, Georgetown University (US). Table 4 identifies some of the major smart city projects. In addition to the linkage research, a comprehensive subject search was conducted using several search engines. As a result of the linkage and subject research, the consortia and foreign government projects are being tracked as part of a MSC selective dissemination of information (SDI) service.

Some Challenges in Developing the MSC

Although there are several challenges facing the MSC such as infrastructure development and the current economic crisis in Malaysia, one of the most critical is human resources. According to MDC's

Executive Chairman Dr. Othman, human resource is a critical issue because of the global shortage in IT and multimedia experts (5). Other comments indicate that MSC observers worry Malaysia's chronic shortage of skilled labour, especially engineers, will pose problems for organisations which want to hire locally (6).

It is estimated that companies which have already received MSC status will require more than 16,000 knowledge workers over the next few years (7). In Malaysia, there is a need to produce 8,000 IT and computer science graduates annually as well as to nurture creativity and entrepreneurship skills.

To assist in the challenge of educating more Malaysians for the MSC, the Government has authorised the establishment of several new institutions of higher education. These include but are not limited to the Multimedia University, the Malaysia University of Science and Technology (MUST), and the Universiti Tun Abdul Razak (Unitar). Unitar is the country's first virtual university. Furthermore, other distance learning programmes and open university institutions continue to emerge into the Malaysian education industry.

Since the MDC recognises the important roles that institutions of higher education play in developing smart-city, the MDC has developed guidelines for allowing education institutions to get MSC status. The guidelines are a positive step towards developing a substantial pool of knowledge workers required for the MSC (8). By awarding MSC status to colleges and universities, they will be able to enjoy the competitive financial incentives including no income tax for up to 10 years, and no duties on importation of multimedia equipment. In order to evaluate applications of colleges and universities that are applying for MSC status, an information specialist, Dr. Edna Reid, was hired as a consultant to assist in designing the assessment instrument.

The recognition of the importance of higher education in developing smart-city can be compared to developments in the Silicon Valley and the Research Traingle Park, USA. The growth of the Silicon Valley was stimulated by education and R&D institutions such as Stanford University, San Jose State University and Xerox's Palo Alto Research Center. Silicon Valley produces more technical graduates than any region in the US - with over 4,100 engineers graduated in 1995 (9). Of this total, 1500 graduates are from Stanford. Additionally, this resembles the development of another high-tech region called the Research Triangle Park located in Chapel Hill, North Carolina, USA. For the Research Park, major universities such as Duke University and the University of North Carolina were an indispensable building block (10).

Regarding human resource development, Malaysia's Education Ministry is leading several initiatives to increase IT literacy, IT teacher training, and utilisation of IT in schools. The education system is being re-engineered. Under the MSC, 90 smart schools will be established throughout the country. Smart schools are networked schools that will be equipped with IT resources to develop personalised, interactive courseware and to access information from around the world (11). In April 1998, the Education Minister announced that all future graduates of local Malaysian public universities, irrespective of their degrees, will be computer literate and competent in IT (12). This announcement was made at the first MSC Educational Forum on 13 April 1998. The MSC Educational Forum was attended by 75 representatives from local educational institutions and provided an opportunity to introduce the assessment instrument. Additionally, the Forum was used to launch a new book "Multimedia Super Corridor: A Journey to Excellence in Institutions of Higher Learning" (13). Although the book was written by four authors, one author is an information specialist. The book examines how the MSC, working in a smart partnership with institutions of higher education, can assist institutions in re-engineering the curriculum, developing new relationships with MSC companies, enhancing competencies of graduates for MSC employment, and achieving world-class status.

Need for Information Skills

As IT training programmes proliferate in Malaysia, one of the major content omissions is information literacy skills. As described in Karelse's description of information literacy discourse in Malaysia, emphasis is placed on IT literacy and information literacy is rarely highlighted (14). She contributes this to Malaysia's emphasis on development of the information infrastructure and the belief that through making the technology transparent, people will become information literate.

Within Malaysia, a few managers are mentioning information literacy. For example, information skills development is in line with Tengku Mohd Azzman Shariffadeen's definition of an IT-literate society. Tengku Mohd Azzman is a member of Malaysia's National Information Technology Council. According to Azzman, Malaysians must develop IT and information literacy skills. He said that an IT-literate society must attain a higher level of information literacy so that one can identify, use, and manipulate information (15). He emphasised that IT literacy should not stop at information literacy but extend to a level of knowledge literacy. Except for training conducted by some Malaysian librarians, most IT training programmes do not include information literacy.

In the US, UK, and Australia, information skills is one of the core competencies for workforces in the 21st century. According to studies of workplace skill requirements in the US, Australia and New Zealand, the process of gathering, synthesising and analysing information is beginning to assume the same level of importance as reading and writing.

One of the premier studies was conducted by the Secretary's Commission on Achieving Necessary Skills (SCANS), US Department of Labor. It identified the fundamental skills and workplace competencies needed for Americans. The SCANS includes several reports such as What Work Requires of Schools (SCANS initial report, June 1991), Learning a Living: A Blueprint for High Performance (SCANS final report), and Skills and Tasks for Jobs (curricula to teach SCANS skills). Summaries are available at www.nsba.org/sbot/toolkit/chnwp.html.

According to the SCANS, the high-tech workplace requires workers who have a solid foundation in the basic literacy and computational skills, in the thinking skills necessary to put knowledge to work, and in the personal qualities that make workers dedicated. Additionally, SCANS states the workplace requires competencies to manage resources, to acquire and use information, to master complex systems, and to work with a variety of technologies. Table 5 provides a comparison of the skills identified for workforces in Australia, UK, US, New Zealand, and Canada. It is a revision of an earlier comparison available at the British Columbia Ministry of Education Skills and Training's website (www.est.gov.bc.ca/psf/data/5nations/append2.htm).

Other Roles of Librarians and Information Professionals

In Malaysia, there is a need to increase IT and information literacy skills, to help alleviate shortage of multimedia skills among lecturers, to train faculty and students to become critical users of electronic services, to develop strategies for dealing with electronic information overload, to design distance education modules, and to provide more support for information have-nots. For librarians, some of these requirements can be categorised under the roles of end-user trainer and technology coordinator.

End-user Trainer

The explosive development in web technologies has exposed the breadth of electronic information available to end-users at their desktop. As a result, more Malaysian librarians have expanded their roles to serve as Internet trainers, webmasters, and Internet subject specialists. For example at the Universiti Putra Malaysia (UPM), a team of librarians provide Internet training to students and faculty. Using a subject approach, the team maintains a value-added library website with links to curriculum resources available on the Web. With the extensive interest in the MSC, the team has over a dozen links to local and international websites that describe the MSC (lib.upm.edu.my/resfrm1.html). At the Sabah Public Library, the Internet team provides on-line training and webmaster consultancy services to government and private industries. The team has led in designing content-based training programmes that help end-users maximise the tools available to them at the desktop.

With the increasing local demand for Internet training and access, most librarians probably have only limited time to expand their training from basic Internet to electronic information literacy. A basic Internet training programme approaches training from a tool perspective where the teaching focuses on how to use Web search engines, electronic transfer of files (FTP), e-mail, and electronic discussion groups. For an electronic information literacy course, the emphasis is on an integrated approach of using information problem-solving strategies to accomplish workplace tasks. This approach moves the focus away from tools and towards accomplishing workplace tasks.

For example, Eisenberg/Berkowitz's Model of Information Problem-Solving identifies six steps in the process of developing transferable cognitive skills (16). The steps include problem definition, information seeking, location and access, use of information, synthesis, and evaluation. In analysing how the model can be applied, the following scenario is used: a manager wants a summary of how the MSC is being diffused overseas and a list of actions taken by foreign businesses and governments.

Table 6 summarises how Eisenberg/Berkowitz's model was applied to the task listed above (17). The information problem was analysed first from a task definition perspective. Several questions were identified; a list was generated of background information; local contacts were called; and keywords were identified. Next, one has to think about the kind of information needed to get the job done. Since diffusion of the MSC concept in foreign countries can refer to the spread of the MSC overseas, it was assumed articles, news stories, press releases, and comments from overseas sources are important.

In addition, information describing the actions taken by foreign governments and businesses are essential resources. Table 7 identifies the information seeking strategies and search statements for locating relevant sources. The strategies focused on contacting relevant persons and searching commercial databases, library collections and websites. In summary, hundreds of overseas articles about the MSC were located. An article in the New Straits Times provides more details of this particular task exercise and describes the actions taken by foreign governments and private organisations (18).

This scenario-based example is a component of an information literacy workshop entitled Electronic Information Problem-Solving for Managers. It provides an approach for assisting clients in developing electronic information problem-solving strategies. Electronic information problem-solving skill is an important competency for the MSC. In converting end-users into information literate persons, several Malaysian university libraries have initiated other programmes. But more programmes are needed.

Technology Coordinator

With rapid technological developments, librarians must continue to expand their roles to become technology liaisons or coordinators. They must continue to anticipate the technological needs of clients; they must monitor, evaluate, and integrate relevant emerging technologies. Also, they must track technological gaps, deficiencies, innovations, and potential solutions. For example, many librarians have not developed strategies for searching the hidden part of the Internet. As Internet specialists, librarians must be proficient in identifying full-text resources on the web and conducting web-based research.

On Internet, a great deal of valuable information content is included in neither automatically created web databases such as Excite or the more selective subject directories (19). Often this content is hidden from the search engines' spider (program that identifies websites). Even the largest search engines such as Alta Vista and HotBot, do not send their spiders behind an Adobe PDF file or other formatted files. Therefore, the content of these full-text files are not indexed in the search engine database.

For example, the NSW Department of Training and Education Co-ordination's key competencies study analyses the skills needed for Australian workforces. This study is in the PDF (portable document format) and contains ten chapters. Yet the chapters are not indexed full-text in search engines. Only the bibliographic information about the report is indexed.

Another hidden section of Internet is the increasing number of free and fee-based sites that require a log-in such as the South China Morning Post Online. The South China Morning Post Online stories are not included in the search engines database because the spiders do not spend their time going through the registration process. A third component of the hidden part is data sets. Many sites contain significant collections of statistical data that are not indexed in search engine databases. For searching the hidden part of the Net, Notess outlines several strategies for librarians. He describes services such as

NewsTracker which provides one with the capabilities of searching at least a portion of the hidden part. NewsTracker is a search engine for recent newspaper and magazine websites, some of which require a log on. NewsTracker is programmed to complete the website registration process.

In addition to monitoring technological gaps, librarians must increase their support to users. In Malaysia, organisations have Internet and Intranet services that are under-utilised. In non-technical departments such as human resources, many end-users are unaware of how they can use Intranet to support on-line training, communication, and information sharing. During the current economic times in Asia, librarians must design specialised workshops or programmes to reach the IT less-literate workforces.

Therefore, the support is needed in specialised areas such as assisting users in forming Intranet teams, conducting information audits, identifying external multimedia resources for a department's Intranet, and helping departments to design and use their Intranet. This type of support is needed also in local knowledge management projects. The concept of managing an organisation's knowledge contains lessons learned in library science, information management, and IT. It involves capturing information, reshaping information, adding value to information, creating knowledge, and transferring knowledge to the desktop. Librarians' skills are needed in this emerging area. In Malaysia, some MSC companies are trying to design knowledge management projects and recruit persons to become knowledge managers.

The challenges of shifting roles for librarians require additional training. Within Malaysia, professional associations should compile a database of experienced professionals who can conduct value-added workshops. Some suggested courses include Telecommunications for Librarians, Using Intranet for Training, Creating an Information Audit, Business Intelligence and Web Resources, Knowledge Management, Designing Qualitative Performance Measurements for Libraries, and On-line Monitoring of Smart City Developments.

Conclusion

Malaysia has embarked on an ambitious plan to leapfrog into the information age by creating the MSC. The MSC will be supported by a high-capacity, fully-digital telecommunications infrastructure and world-first legislative framework. With the planned sophisticated capabilities of the MSC, it is important for Malaysians to be full participants in the planning and implementation of this mega-project.

For the MSC, one of the major challenges is the development of human resources. Malaysia must educate and train thousands of engineers, programmers, systems analysts, and other knowledge workers for the MSC workforce. Librarians are major players in human resources development. They are empowering end-users to deal systematically with electronic information overload, to exploit multimedia for education and research, to create more local content, to assess content critically, and to use web technologies for lifelong learning. Their roles are shifting rapidly to a greater emphasis on training end-users to become Internet and information literate. As illustrated in Table 5, countries such as Australia, US, and New Zealand have analysed the skills needed for an increasingly global high-tech workforce and identified information literacy as one of the core competencies.

Historically, librarians have been on the forefront of technological developments which support the proficient use of information. With the rapid pace of technological innovations, they are starting to expand their roles to trainers and technology liaisons/coordinators. They are analysing the technological needs of clients, monitoring the emerging services, evaluating performance of the technologies, and integrating relevant technologies into the library's operations.

With further implementation of smart city projects, librarians will become more involved in their organisations' corporate-wide Intranet teams, community outreach projects, outsourcing services, distance education projects, knowledge management projects, information entrepreneurship, lifelong learning projects, and business intelligence ventures. Yes, librarians' activities and physical locations will increasingly be outside of the library. To assume these emerging roles, they must continue to participate in leading-edge training programmes, conferences and innovative projects. Smart city developments will expand the responsibilities of librarians/information professionals in unprecedented ways!

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Back to contents

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LIBRARY LEADERSHIP AND RE-ENGINEERING - AN ISRAELI EXPERIENCE

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Introduction

Re-engineering means leaving the old system and creating a new one with new concepts and rules. Leadership is needed to initiate, convince and take actual steps towards fulfilling such new targets. Leadership and creative thinking are required on an institutional and on a national level. Today, in Israel, the university libraries are leading the change in information services. Not all the university libraries are at the same stage of change but none of them is afraid of being bypassed.

Changing concept on an institutional level

The main component of leadership is the ability to create a new vision or to revise an existing one and to link it to a strategic plan for implementation. A change of concept or vision in an academic institution is a long and difficult process, but when the new concept is attained and serves as a long-term aim, it has a chance of success. At the Technion, the vision of one library system and not twenty independent libraries dictated the actions taken by the central library during the past years. The central library defined its vision almost twenty years ago and although it has been revised during the years, basically it remained the same. Combining the Technion libraries into one system meant using all campus resources for better bibliographic services to students and researchers. It was clear from the beginning that radical physical change was not applicable. Computerization was used to overcome physical barriers and to force the departmental libraries to accept the same working procedures. It was difficult to implement this vision without full administrative authority over the departmental libraries, but today it is definite that the central library has the professional authority over the Technion libraries. The success of computerizing the traditional library system was the basis of the change of concept from decentralized system to a one centralized electronic library.

Five out of seven universities in Israel including the Technion have decentralized library systems. Such a system is convenient to the faculty members because the library is located close to their offices. In many cases this situation is an obstacle to a modern library organization especially when the departmental libraries does not report administratively to the central library, but to their faculty deans.

At the Technion there is a central library and twenty departmental libraries. Even twenty years ago it was clear that controlling the departmental libraries is the key to professional progress. A major part of the literature budget was allocated by the Technion management to the departmental libraries and the central library was expected to supply technical services to them. Today the Technion departmental libraries still do not report to the central library but they are obliged to work according to the same set of professional rules and are part of one bibliographic system.

The departmental libraries have been lead step by step to work as a system and not individually. They lost a big part of their independence and influence, but their profit was in the professional and bibliographic area. The improvement in their services was worth the price for they could not have reached the same achievements by themselves. The process was presented to them as cooperation. Problems were discussed together with the departmental librarians and part of the new rules were defined together with them. Some areas were left where the departmental libraries can continue to work independently according to their local needs. The central library was always aware that it must give satisfactory service to the departmental libraries and not avoiding problems raised by them.

Parallel to this process the central library invested efforts in building its status as the libraries' leader in the eyes of the Technion's management. It is important to remember that influence is acquired not necessarily by authority but also by being professionally respected. These efforts led to receiving responsibility on central resources especially in the computerization areas.

The traditional integrated library system

Today, the books and journals available in all of the Technion's libraries are included in one unified catalog maintained by the Central Library. This catalog is linked to the campus network and is also available in WWW version, with access via the library homepage on the internet. All of the Technion's libraries use the same computerized circulation system based on one common readers' file. The public catalog and circulation are parts of the "Aleph" integrated system. The cataloging and classification of books and journals, the acquisition of all library materials, as well as acquisitions' budget control, are handled by the central library for all of the Technion libraries, using the same "Aleph" system. Inter-library loans are done by the central library for all Technion's customers. The central library is responsible for introducing, upgrading and maintaining computerized systems for all the libraries on the campus.

The electronic library - a revolutionary change of concept

Today, it is accepted that both the traditional and the electronic library will exist together in the near future. It is predicted that the balance between the electronic and the traditional library will change gradually, but in the meantime investments of budgets and manpower are required in both. The electronic library is an excellent chance for library re-engineering as it is a new system which can work parallel to the traditional library. Re-engineering creates the opportunity to change old concepts, to define new rules and to introduce changes in librarians' duties, in readers' services, in budgeting , or in other words in all areas of library activity.

A university library which wishes to offer modern services and to keep its respected status must invest continuing efforts in adopting new technologies. It is also important to convince the university management of the new concepts and needs. At the Technion, the central library took the resonsibility for the development of the electronic library. Eventually this was a relief for most departmental libraries which could not compete with new technologies by themselves. The central library also took upon itself the responsibility of teaching and guiding all the librarians in how to use the new systems. This is being done continuously on a permanent basis.

The Technion library system is still physically decentralized. It was a long way to create one bibliographic system with one computerized networked catalog and unified rules for professional work. Following this, full centralization of the electronic library was a logical step ahead. As the electronic library has no walls or physical location it was decided by the central library to develop it centrally according to the needs of the entire campus. This was the chance to change the old concept of decentralization. The central library used its experience in computerized systems, its control on the technical services given to all campus libraries and its respected professional status in the eyes of the departmental librarians and the Technion's management.

The electronic library at the Technion

The beginning was with major databases on the Novell network several years ago. The Novell network was accessible via the campus network by PC's only. At that stage some of the departmental libraries purchased databases on stand-alone workstations. With the advancement of technology, better solutions were offered in the market. The central library created its homepage and started to connect databases to it. The homepage is accessible from all types of computers connected to the campus network. Wherever possible it was decided to choose the Web version of the databases which is based on Netscape and users find it easy to deal with. Netscape browser is supported by the Tecnion's computer center and most potential library clients know how to use it. It was decided to use an IP access to the databases where possible and not passwords which are an administrative burden to the library and to the readers. An IP access means that a simple click on the database name in the library homepage menu, brings the reader directly into the search. It also means that the location of the database, on a local server or on a remote computer abroad is transparent to the user. The library uses a special proxy to prevent non-Technion users to reach the databases. This proxy allows all Technion users to reach the databases without using password or identification number. This arrangement works very well. Only one IP number identifies the Technion at the vendors' computers and all computers having Technion's IP number, even if they are at faculty members homes can reach these databases. The library acquired special faster internet lines for the use of remote databases and electronic journals via this proxy.

Centralizing the electronic journals collection

Electronic journals are connected to the library homepage according to the same principles as above. All of them are located on remote computers and available via internet. Netscape and Acrobat Reader (software needed for unzip full-text) are common tools for using them.

The Central library used administrative power where possible to impose the change of concept especially in the area of e-journals. This was possible because the electronic subscriptions are usually based on the paper subscriptions and these were traditionally under the aquisitions' responsibility of the central library. In order to develop one e-journal collection at the Technion, the central library announced that all electronic subscriptions should be done centrally. The purpose behind this was to enable all campus users to use the e-journals, although the paper edition is usually available in only one or two departmental libraries. The departmental libraries were not allowed to contact the journals' agents directly. They could not do it without commercial details available at the central library only. Also, the special proxy is controlled by the central library. After a few experiments were done without success, by departmental librarians to connect e-journals to their faculty network, they understood the amount of knowledge and technical work needed and began to cooperate with the central library. The central library took the mission of linking e-journal to the campus network despite all the difficulties, absorbing the costs and the technical work.. The result is one system available everywhere on the campus network.

The electronic library - more administrative aspects

Today hundreds of databases and e-journals are available via the library homepage on the campus network. They serve all departmental libraries, students, researches, laboratories etc. This change from a decentralized physical library system to one centralized virtual library was a change of concept dictated by the Central library and accepted by the departmental libraries who understood or were convinced that building an university electronic library is beyond the ability of one single library. Not all the departmental libraries agreed to it easily. Some of them tried to resist and develop parallel systems with the help of faculty members who understood the glory of having their own site of the electronic library. Finally they had to accept the central control on the electronic library whose benefit is enormous. Also the cost was beyond the ability of one departmental library. The faculty libraries were encouraged to add their contributions to the main system by collecting free electronic information in their areas and arranging it in a secondary homepage which is connected to the central library homepage.

Another partner in this field which should be mentioned is the Technion computer center that helps in advising and supporting library systems, but does not enjoy in the glory of the achievements. As a result when it comes to investing more technical work on a local server, the library realized that it cannot always rely on the computer center which has other priorities. Sometimes it is necessary to buy support services from other sources and to rely more on library staff.

The library used its achievement in the field of the electronic library to convince the Technion management to adopt the concept of centralization of the virtual library also from the budgetary point of view. According to the library policy, electronic information is free to all of the Technion's users. Site licenses are paid from the central library budget. This policy is supported by the Technion's management. The results will be seen in greater budgets for equipment and databases licenses' fees allocated to the central library. As a result of its activities the central library received a donation for renovating its building. The main purpose was for the creation of a new computer-cluster (50 PC's) in the library. Via these computers all electronic resources can be reached. This cluster is mainly for the use of students.

Centralization - future plans

After the concept of centralization has been accepted in the area of the electronic library, further thoughts led back to physical centralization. The direct reason for this was the expensive cost of manpower needed for keeping twenty libraries open at the same time. Also, faculty demands for building additions to existing libraries led to a discussion on limiting the number of libraries in the campus. One possibility which has already been considered in the past was combining two or three adjacent libraries together. This solution failed in the past mainly because of faculty resistance.

A new idea was brought up this time by the central library. The idea was based on the availability of the electronic library which is the new research library on the campus network. The aim of the new idea was to save manpower and to improve the service to students. The central library suggested to relate to the departmental libraries as the "paper" research libraries and to open them only during one working shift. Their main clients, faculty and researchers will use keys or magnetic cards to enter the library in the afternoon if needed , the same as many of them already do today. Most researchers do not sit in the library but enter it in order to take a book or journal to their offices. According to the offered plan most students services will be transferred to the central library which gives about 40 percents of these services today. Limited opening hours and less services will curtail manpower in the departmental libraries significantly. Only part of this manpower will be needed in the central library in order to give modern services and guidance to the students. The main expense needed to perform the change is the cost of a new wing to be added to the central library building.

This proposal is under consideration at the Technion academic management. It is a revolutionary proposal, and it is too early to predict if it will be adopted. Two or three years ago, there were not any chances that the Technion administration would listen or consider such a plan. Only now when the concept of centralization is accepted and the results are positive, further steps in this direction can be made.

The Israeli University Libraries' Consortium

There are seven major university libraries in Israel. During the last years quite a number of new colleges have been founded, but their libraries cannot compare in size and contents to the universities. Many of the new colleges would like to rely on services given by the university libraries, which raises the problem, due to budgetary reasons, how and on what scale to cooperate with them. Only two Israeli universities have one centralized library. The other five universities including the Technion have a physically decentralized library system. Out of these five only the Technion libraries are working as one system, but at the rest, higher level of cooperation has been achieved among the libraries of each university. Part of it is the result of the decision made in the mid-eighties to introduce the same computerized system, "Aleph", to all Israeli university libraries. So, even though there are several separate catalogs within one university with several libraries, the catalogs are easily accessible. All the catalogs are connected to the campus networks and to the national academic network. In addition there are national catalogs of books and periodicals. The computerization of the traditional library services in Israeli university libraries using "Aleph" software was a result of an initiative taken by the library directors and supported financially by the Council of Higher education.

During the last two years a new initiative has been taken by the library directors in order to cooperate in acquiring and installing databases and e-journals on a national basis. The libraries realized that developing a large scale electronic library requires resources that are beyond the ability of one library. Furthermore, there are packages like ISI databases or Academic Press journals which are not offered to individual libraries but to consortia only.

A proposal on this subject was brought to the Israel Association of University Heads, and it was recently decided to establish a framework for joint activities relating to digital information services. The Israeli Council for Higher Education will again support financially the planned projects. Other budgetary sources are the universities themselves and donations. The new consortium services will be based on local servers and on access to remote computers abroad. ISI Web of Science which is located on a local server, already serves the Israeli academic community. A major project planned by the consortium is joint access to electronic editions of scholarly journals. Negotiations are underway with several publishers and suppliers. The next contract is going to be signed with Academic Press. The Israeli academic consortium cooperates with other consortia of libraries.

Conclusion

The developments in electronic publishing, electronic information and the electronic library has a tremendous affect on libraries' organization and administration. Libraries should use the technological change for the benefit of their readers and parent institutions. They should lead the change, use their growing power, initiate new concepts if needed and beware of being led by others. This is true on an institutional basis as well as on a national basis.

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Back to contents

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Global Literacy Initiatives:
The United States and Developing Nations

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Changing information technologies are forcing librarians in the developed world to take a new look at the criteria for information literacy in their societies. Here we will investigate some aspects of the development of information literacy in the United States. We will explore the definition of the concept and discover some specific competencies entailed in the creation of the information literati as promulgated by libraries and librarians in the United States. Next we will discuss the philosophy that supports some of the policies surrounding the advocacy of information literacy. We will then look at some of the roadblocks to information literacy in developing nations with a view toward exploring alternative routes to information literacy.

Information Literacy in the United States

The concept of information literacy has been formally articulated in the United States since 1989. It is a barometer of the sea change which has occurred as a result of technological advances in the area of information accessibility. Prior to the advent of computer networks, the MARC record, automated catalogs, article databases, and the Internet, one of the primary purposes of the library was to provide a repository for culture. Shera once stated that the "proper study of the librarian is Man." [1] Although the dissemination of knowledge was a part of the library's mission, it served first and foremost as the protector and assimilator of the knowledge of a culture as it existed in written form. The model has since shifted away from library as repository to library as facilitator. With the rapid development of communications technology we have moved from the age of knowledge of man to the age of information and its retrieval. As part of this process, our efforts to understand ourselves have moved from preservation to literacy.

The often quoted definition of information literacy presented to us by the American Library Association reads:

> To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information...Ultimately, the information literate people are those who have learned how to learn. [2]

There are a great number of assumptions associated with this statement, not the least of which is that there be a repository for the information, and that it be in written form. The American Library Association also echoes the concepts of free information in a capitalist democracy. Information should be timely, should flow freely, should not be subject to governmental control or censorship. The final report clearly states the importance of information literacy for individuals, business, and citizens of the United States.

The recommendations of the final report suggest the following:

- Reconsideration of the way in which information is organized, accessed, and defined.
- Formation of a Coalition for Information Literacy under the leadership of the American Library Association in cooperation with other agencies.
- Encouragement of research related to the use of information in its current form, as well as demonstration projects relating to information and its usage.
- State and regional bodies involved in the provision of education should take into account the importance of information literacy and provide the means by which all students might become information literate.
- Train educators to become information literate and in doing so become facilitators in the process of learning.
- Promote the themes of literacy, democratic citizenship, and productivity articulated by the White House Conference on Library and Information Services.

In March of 1998, the American Library Association Presidential Committee on Information Literacy issued ***A Progress Report on Information Literacy***. The returns have been quite favorable and progress has been made on all six of the recommendations, although work remains to be done. The recommendation for further progress that speaks to the heart of this paper states, "There needs to be an emphasis on communicating that quality education requires not only investments in technology, but also in programs that empower people to find, evaluate, and use all information effectively." [3] This may be the most important sentence in the report.

Information literacy programs have been appearing on a multitude of college and university campuses throughout the United States. The Coast Guard Academy, the University of Massachusetts, the University of Hawaii at Manoa, and the University of Wisconsin-Parkside each provide us with slightly different versions of the same concepts. [4] Most information programs have several things in common. As rule, they all provide a definition of information literacy similar to that articulated by ALA. They recognize the effects of technology on the delivery of information. They recognize the effects of technology on the amount of information that is being produced. They frequently emphasize evaluation of sources. Most importantly, they tend to describe the means by which information literacy can be achieved. They recognize the glut of information and profess to provide the means by which individuals can process what they need from it.

The Philosophy of Information Literacy in the United States

The greatest single impetus underlying the encouragement of information literacy in the United States is to provide an informed electorate. The movement to ensure information access to every citizen of the United States has long been the mainstay of libraries and their development, both public and private. The United States supports a federal depository library program which requires easy and common access to the collection as many hours as the library housing it is open. The United States subscribes to the concept that information is power, and that it is important in government and business as well as a form of personal edification. Information literacy, as a factor of lifelong learning, is seen as a civil right by most , and as a civic responsibility by many.

Why should the philosophy behind the provision of library service and the development of information literacy in the United States be of any interest to the developing nation? If information literacy, easy and open access to information, and lack of content control over information systems is part and parcel of democracy as it is practiced in the United States, it colors the expectations the policy makers have for those for whom they wish to provide development assistance. Consider the implications of Halperin's statement, "States that are constitutional democracies are less likely to go to war with the United States or other democracies, and are more likely to support limits on weapons trade, encourage peaceful resolution of disputes, and foster free trade." [5] It is the coordination of cosmopolitan and communitarian philosophies that drives foreign policy in the United States, as well as the hegemonic position it currently enjoys in the international arena. On one hand we look at ourselves and the riches we enjoy and expect others to want the same things. On the other hand, we look at ourselves and the riches we enjoy and want to protect ourselves against others who want the same thing.

Jean Baudrillard may take the concept to the extreme in his criticism of the developed nations as a whole when he states, "We are the consumers of the ever delightful spectacle of poverty and catastrophe, and of the moving spectacle of our own efforts to alleviate it...." [6] However, the West and the United States in particular has often failed to recognize cultural difference, sometimes with quite fatal results. When Baudrillard indicates that the vast glut of information is causing history to become a simulation of itself, he comes much closer to articulating the problems we are facing in the developed world, and the uncomfortable position in which we put ourselves in when we think these problems are universal.

The development of technology is clearly closely tied to the national psyche of the United States. Democracy has been considered a progressive form of government. Combine that with a dedication to capitalism, and technology becomes a driving force in our economy. We need improvements, progress, substitutability, and obsolescence to remain economically healthy. Technology has become part of us and we are at risk of having technique become part of us as well. By this we mean the technique articulated by Ellul and others that assumes there is only one way that things can be done. [7] It is the dehumanization of tasks, and the assumptions that follow.

Consider that we move from protocol to paradigm to technique to technique. We begin with simple rules that become absolutes governing much of what we do, see, feel, hear, and write; rules that govern our society and culture built not around human differences, but around the dehumanized and mechanical. These are the pitfalls we encounter as we try to make our view of information literacy fit the needs of developing countries whether our motivation be enlightened self-interest, democratic zeal, or post-colonial guilt.

Roadblocks to Transferable Initiatives

The information literacy initiatives taken by the United States can provide a framework for viewing the problems encountered in developing countries in the area of information studies. The driving force behind literacy initiatives is the management and understanding of the information explosion. If the glut of information did not exist, we would not have the problem of sifting through it. If all of our academic users were dedicated researchers, we wouldn't need to emphasize user instruction. If all systems were intuitive, we wouldn't need to understand the differences between them.

Before looking at the differences underlying literacy initiatives between the United States and the developing world, lets look at one striking similarity:

> ...students lack the qualities of independence, of self-direction and even of simple curiosity in their attitudes to learning. These spoon-fed, uncritical and, as a result, mentally lethargic students are not prepared for learning, let alone a lifetime of it. [8]

This was written by Behrens in referring to South African students, and it is probably cold comfort that the same statement might be applied to many students in the United States. It is easier to take what you are given, much more difficult to seek it out yourself, process it, and have it become part of your self. Here, at least, the problem of the individual's ability to "recognize when information is needed" is a shared problem. Our differences lie in the degree to which this indifference affects our societies.

A problem shared by many developing countries in promoting information literacy programs is simply the illiteracy rate in the nations. The estimated illiteracy rate in the United States is .5 percent. According to UNESCO figures, Uganda had an illiteracy rate of 43.9 percent in 1991, Mexico had a rate of 12.4 percent in 1990, and Brazil posted a rate of 20.1 percent in 1991. [9] The problem of illiteracy is a recurrent topic in the writings of Peter September, Maurice Lundu and Godfrey Mbewe, and others. [10] The imposition of a foreign language such as English on a culture with strong oral traditions simply compounds the problems facing advocates of information literacy in developing nations.

Another problem facing the developing nations is in the area of publishing. The United States produced 48,146 new titles in 1991 compared to 717 titles in Ecuador, 21 titles in Gambia, and 494 new titles in Algeria according to UNESCO figures. [11] Why is publishing important in the context of information literacy programs? The lack of a thriving publishing industry reduces the assets available for information professionals to lobby governments for support of the programs. There is simply no vested interest that is recognizable by those in power. In a related matter, governments in developing countries often do not recognize the importance of information as a resource.

Illiteracy, lack of publishing, lack of recognition of the importance of information and information professionals, and governmental instability are more tangible than the final roadblock to adoption of information literacy initiatives. The lack of understanding between cultures is probably the greatest problem and this is often aggravated by the lack of understanding of one's own culture. We currently digitize maps, documents and other items for later use. Yet we emphasize the written word in almost all of the writing we do concerning information literacy.

The graphically oriented aspects of technology should be used to the library's advantage in meeting with the oral traditions of many societies within developing nations. Does everything that is meaningful only exist in written form? In turning to preservation, we also increase the ability to access a diverse collection of information. Technology is moving a literate culture to a graphically oriented culture. The oral cultures of many developing nations could find technology helpful in moving from a non-literate culture to a culture better able to compete in the literate world. Conclusion and suggestions for further study

Ultimately, the whole cloth of the literacy initiatives developed in the United States cannot become a pattern for global initiatives as they exist today. There are simply too many areas in which the developing country does not match the pattern articulated by the United States whether it is literacy, academic status for librarians, oral traditions or governmental support. This should not necessarily be cause for alarm, however. It should be cause for celebration in many cases. The problems that developing nations encounter in attempting to apply the United States model can be turned to their advantage. Fayose is right on target,

> Library educators and practitioners must make serious efforts to decolonize their brains of the British and American legacy of librarianship and evolve their own philosophy. [12]

In doing so, they can avoid the surrender to technique and the concept that things can only be done correctly in one way.

Much work needs to be done to tailor a useful system for information delivery and the skills needed to deal with information in the developing world. Veronica Jacobs discusses many possibilities and emphasizes, "Users should be given the opportunity to choose how they want to learn, whether through observing nature, listening to and speaking with village elders, studying books and journals, using mass media or surfing the web." [13] The developing nation has resources that have been lost to many developed societies. Take advantage of these resources and use the technology being developed for others to your own advantage. You will be pressured to develop information literacy initiatives through many avenues. Adapting initiatives to fit your culture is one way to remain relevant during the information revolution and at the same time retain that which is unique.

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Back to contents

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IATUL

THE TRUTH IS IN THE DETAILS, LESSONS IN INTER-UNIVERSITY LIBRARY COLLABORATION

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Inter-institutional collaboration on the scale of the TriUniversity Group of Libraries is a series of complex challenges. To bring together three different organisations with quite different histories and cultures, backgrounds and personalities, and to expect them to work effectively is naive, foolhardy, or visionary. It certainly requires the determination to plan and nurture. While it is important to understand the "why" and the "what" of collaboration, I commented on these last year; these comments can be found at http://www.lib.uwaterloo.ca/info/IATUL/index.htm. Today I hope to give you a sense of our "how".

Effective collaboration is not accidental; there are processes that can be used to make collaboration more valuable and successful. Early on, we recognised the issue of "cultural transformation". We allowed and encouraged a conscious and open examination of values, personal systems and attitudes. Our collaborative strategic agenda introduced organisational changes that penetrated each institution's inner structures. Over time, through many meetings, we gained the understanding that we needed to anticipate and prepare for the effects of change. We predicted that conflicts would result and should be prepared for. Preparation took the form of support for training in human relations and life skill as well as in technical abilities and computer skills. Our biggest investment has not been in hardware, which will wear out, or in software, which will be replaced, but in people, who will endure and leave a legacy. Knowing that collaboration will save time and money in the long term is not enough. A substantial investment in human resources is required.

Four areas of influence in creating a human climate for effective inter-institutional collaboration are critical:

- Building relationships,
- Learning,
- Leadership and
- Community building.

1. Building Relationships

The most important characteristic of successful collaboration is quality human relationships. Library leaders must recognise the need for certain life skills. These skills must be identified, developed, and sustained among the staff of the collaborating organisations. Partnerships must be sought out and established by getting to know each other, spending time together and working on events, projects or teams. Despite the geographic proximity of these three libraries, few of the staff knew each other or had worked together in other contexts. Library leaders created events that had a goal of bringing staff together. "Library Leaders" are not necessarily senior management or line managers although they certainly contributed. Anyone who led a team in the collaborative spirit is included in this term.

An example of relationship building occurred in the fall of 1995, the combined staff members of the three Circulation (Access, or Issue) Departments (approximately 80 people) spent a day together "work-shopping" ideas about collaboration and change. These were front-line staff, sometimes overlooked in the planning stage of co-operative ventures. Several interesting and important ideas emerged from these discussions. Since the time of this workshop the circulation team has worked towards TUG-wide circulation harmonisation practices. This harmonisation process required a level of team work and group process unprecedented in our organisations. Looking back we can see the importance of that initial workshop in creating the key relationships that would be critical in the development of other harmonised policies.

A similar focus can be seen in the complex organisation required to select and implement an integrated online system for TUG. The system selection process directly involved more than 30 people from all three institutions as key decision-makers and co-ordinators. Many more library staff members from the three universities and affiliated and federated colleges were involved in demonstrations, feedback sessions, planning and testing. This major task led to the first collaborative decision for TUG. It was critical that process build effective relationships. By establishing a good working procedures based on some key principles of collaboration (accepted criteria, shared understanding, empowerment, and accountability) the libraries were able to draw staff together around a critical decision and enable effective working relationships.

A critical component in building relationships is trust. Trust is the basic constituent, the "glue", necessary for effective collaboration and teamwork. Trust is earned over time in situations of mutual interest and need. Trust is gained by being trustworthy. Creating opportunities to allow trusting relationships to emerge is central to a collaborative strategy. It is necessary to acknowledge that conflict is a normal outcome of co-operation. Resolving conflict is a means of testing and forging even stronger bonds.

TUG collaboration did not happen "to" the libraries, it happened "with" them. It was by an inclusive process with emphasis on widespread participation and consultation that TUG moved forward. Staff members were entrusted with important work, important to them and important to the success of the enterprise. From the outset, the TriUniversity Group of Libraries sought the active involvement of library staff, the user communities and the university administration. We sought the advice of circulation clerks and presidents, part-time staff and business officers, librarians and faculty members. By involving as many individuals, as much as possible, TUG has been able to build commitment and understanding. Commitment has shaped the initiative to meet the needs of the all users: students and library staff, learners and teachers, administrators and auditors. The "getting acquainted" stage was an opportunity to meet, build relationships, explore new ideas and express concerns. Staff members were provided with the opportunity to learn from each other and to gain self-confidence in their competence. The key outcome was trusting; the development of a level of trust that has become the foundation for all subsequent work, innovations and initiatives. Staff members have considerable freedom in choosing how they do the work. They know that it is important, because we listen and we are influenced. And we are having fun!

By investing in staff involvement, front-line staff, as well as librarians and administrators, at both the conceptual and the operational stages, TUG has nurtured a commitment from users, staff and senior administrators. Motivated staff in an empowering environment allows the collaboration to withstand difficult times and hard decisions.

2. Learning

Shoshana Zuboff, in In the Age of the Smart Machine, indicates that "learning is the new form of labor". Peter Senge, in The Fifth Discipline, speaks about "learning organizations". Zuboff and Senge highlight another lesson that we are learning about collaborative organisations: the importance of continuous learning; learning as the focus of work. The organisation that emerges from collaborative ventures is different from the sum of its parts. The emergent organisation learns about itself: how it views its world, its values, and its focus. How does the organisation respond to challenge? Learning becomes central to the development of alliances. Staff members must come to terms with ambiguity and uncertainty; there will be many more questions than answers. The importance of learning is demonstrated by learning behaviour. Senior management has been in learning situations with front-line staff; they modelled the attitude that learning is natural and essential for all staff. We have attended courses and seminars together with staff members. Learning is part of our jobs. It is what we do.

The TriUniversity Group of Libraries has made a sizeable investment in training and development as a means to enhance learning. In June 1995 Richard Dougherty lead a "Preferred Futures Workshop" involving diverse staff from the three libraries. It was from this workshop that the participants jointly evolved the idea of "one library service" that forms the metaphorical goal of harmonised services and resources.

At various stages of the collaboration TUG has employed external consultants to assist staff. There was initial scepticism to the need for consultants; some thought, "we can do it ourselves." In hindsight this involvement has been invaluable. Experts have provided a "reality check" to TUG plans and processes. Most importantly the involvement of consultants and others allowed TUG to open itself up for scrutiny. It allowed the consultants and the staff to critique the collaboration. Each time TUG not only received expert advice; the events allowed staff to articulate concerns and work through problems.

[A particularly important resource has been the continuing involvement of staff from the Association of Research Libraries, Office of Management and Leadership Services (OMLS). OMLS staff has lead various workshops and sessions for TUG professional staff focused on management practice and team building. Working with OMLS allowed the libraries to study and practice the same philosophy of library management and administration.] We grew together around common ideas and shared experiences; this was an important reinforcement of the strategic direction taken by the libraries.

In February 1998 a TriUniversity Group of Libraries Collections Workshop was held, bringing together, for the first time, approximately 30 librarians and staff involved in information resources management. This two-day event provided an opportunity to review this most difficult of all collaborative areas. While the focus was on collections management, the workshop also provided a chance to critique and re-commit to TUG initiatives. In this case involvement from the University Librarians was minimal; it was largely a staff directed initiative. It resulted in a renewal of the faith in the collaborative agenda and accelerated activity in TUG collections and information resource matters.

The learning will continue. TUG is constantly exploring new territory in the area of multi-institutional collaboration. More people throughout the organisations are creating opportunities for collaboration and for learning.

3. Leadership

Senior administrative commitment is fundamental; the University Librarians actively promoted and supported the collaborative strategy both within the libraries and within the academic and administrative groups on campus. The University Librarians modelled cultural expectations by working collaboratively as a team of three. The support of this group was visible, positive and frequent.

Team building in a collaboration environment is difficult; this is not the traditional work of administrators or leaders. It requires a commitment to a new approach and a new organisational focus. It is difficult for one organisation to make these adjustments and changes; it is even more difficult to orchestrate three organisations in making these transitions more or less in harmony.

It is imperative, however, that the University Librarians be committed to leadership and resist the temptation to control or manipulate. I have, like many of us, learned command and control management skills from some very accomplished mentors. This style is based on fundamental and honourable principles:

- Setting clear objectives,
- Delegating appropriately,
- Controlling a span of activity and
- Establishing and mutually agreeing on accountability.

It is a very effective management style. Nevertheless staff members want more from their jobs and their needs can be met by blending into this rational management style a more natural approach. Leaders need to adopt equally effective and different philosophical assumptions.

- Sharing a clear commitment to client needs
- Modelling the benefits of risk-taking and rewarding initiative,
- Looking at the problems openly,
- Establishing self-confidence through success.

Having nurtured relationships among staff, staff must be given the responsibility and authority to make things happen, to shape the emerging nature of the consortium. In the library online automated system selection process, a heterogeneous staff group had considerable authority. These people, drawn from throughout the libraries, were responsible for the evaluation and selection phase. They managed this process with considerable independence from the University Librarians. This achieved an important objective, that leadership became a responsibility of all staff.

Leading by example has also meant dealing with disagreement and discord among the three University Librarians. The University Librarians do no always speak with one voice; they do not always agree on all issues. Working through our disagreements openly has helped to develop more than tolerance for diversity. It celebrates diversity. It shows an acceptance and encouragement of divergent thinking. It models the application of creative tension towards shared goals.

The empowerment invested in the teams that operate the TUG initiatives encouraged commitment and ownership. These teams demonstrate trust by senior management. A sense of stewardship is emerging in which the care of the whole is considered not the individual institution. When an issue arises, the first question should be" what does this mean for the collaboration?" not "what does this mean for my library?"

An important new element in TUG leadership has been the creation of the position, TUG Program Co-ordinator. The role is one of facilitating, co-ordinating and assisting the important communications processes that the TUG University Librarians were unable to continue to do effectively, as inter-institutional collaboration grew. He is an extension of the threesome, not an Executive Director, nor a fourth University Librarian.

It is interesting to consider how the library leadership affected and was affected by other sectors of the universities. There was little to prepare the university or the library for the consequences of the collaboration. The University Librarians were fortunate to discover, in the process, that those administrative units on which the libraries depend for services were willingly supportive.

4. Community Development

is perhaps the most important issue to be recognised. In the course of planning and implementing a team-based approach to managing library services, library leadership has consciously and deliberately enabled "the community" to focus on user needs. Community development has not only been about committee structures or supervisors' responsibilities, or terms of reference. Community development has been these all of these effectively working together. Our goal has been to enable a new culture by establishing new methods, approaches, actions, interactions and other aspects of organisational behaviour. Designing community is not a typical management skill; understanding "community development" has not been easy. In inter-organisational collaboration local need is still real and immediate. We are not one organisation; we are three organisations linked together. There are still local identities and local cultures that are respected and enhanced. There is still concern among the staff members, librarians particularly about TUG as a shadow over their individuality. Maintaining a balance between consortium focus and local focus is a key aspect of developing a TUG culture that will be compatible with those of the three universities.

In this context one easily can underestimate the difficulty of making the transition to teams and to collaboration. During the change of perspective from "me" to "us", from "I" to "we" from "them" to "us", there are many opportunities to revert to the "old ways" or the "way we always did it." Sustaining the culture of the collaboration requires attention and maintenance. Teams need to be re-energised and re-focused. Values clarification is an important element of this. Are the values guiding the teams the same or divergent? Surfacing these issues will require frank and open discussions about value, sometimes an arduous and inharmonious process. Developing a sense of community over time will be a prime objective.

These are some of the lessons we learned in the TriUniversity Group of Libraries collaboration.

> ***A collaborative creation of:***
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> *1998-05-20*

Back to contents

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MILLENIAL MEGATRENDS:
FORCES SHAPING THE 21ST CENTURY

by

Philip H Spies[1]

INTRODUCTION

Mr Chairman, ladies and gentlemen

I wish to thank the organizing committee for the invitation to address your conference on the subject of "megatrends" - ie, all embracing societal forces of change that are shaping our future. You will appreciate that the rationale underlying "megatrends" is very complex because of its systemic nature; it implies some understanding of the interwoven processes which constitute the fabric of long-term societal change. It is therefore only possible for me to present you here with a few outlines - simplifications, or models - of the complex forces that are changing global society.

Within this context I see my task as, firstly, to identify and discuss a few of the most important historical change levers (ie, the historical factors which initiated broad-based societal change) and, secondly, to describe the nature and consequences of the societal changes that followed. If I am presenting the case within a somewhat deterministic mould it is only done to reinforce the key message that modern change is technology driven.

In this spirit of extreme simplification my presentation will centre on two periods, namely a period of 200 years which spans an "age", and a period of 50 years which spans a technological "wave". Our focus will primarily be on the past 200 years since the start of the "Industrial age". However, for the purpose of comparison it may also be usefull to focus briefly on the two 200 year periods which preceded the industrial age (see Figure 1), namely the Renaissance (broadly speaking ca 1375 to ca 1575) and the age of enlightenment (broadly speaking ca 1575 to ca 1775).

The term *Renaissance* means literally "rebirth", and was for the first time used by the French historian Jules Michelet to describe the period of approximately 200 years between the late 14th century and late 16th century when the fragmented feudal society of the Middle Ages, with its church dominated social order, was transformed into a society in which central political institutions, an urban commercial economy and lay patronage of education, arts and

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[1] CREATIVE FUTURES CC. Former Director of the Institute for Futures Research (IFR), University of Stellenbosch, and currently a Research Associate of the IFR. Keynote address to the Annual Conference of the International Association of Technological University Libraries (IATUL), June 1, 1998 at the University of Pretoria, South Africa.

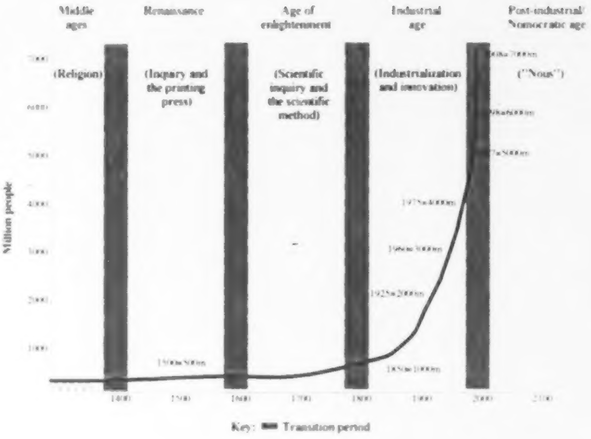

Figure 1: Five "ages": Building towards the 21st century

music became the norm. The study of history (with contributions by authors such as Leonardo Bruni and Niccolo Machiavelli) became a branch of literature rather than of theology. The *Renaissance* started in Italy and spread to the rest of Europe during the 16th century. An almost symbolic invention of this age was the Gutenberg press, which was named after its inventor Johann Gutenberg of Mainz in Germany. The explosion in the printing of books and position papers which followed this innovation initiated the first "information revolution"; one which *inter alia* contributed towards the Reformation and, in general, towards the rapid diffusion of new ideas and scientific theories throughout Europe.

The concept "enlightenment" refers normally to the emergence in 18th century France of progressive and liberal ideas that later contributed towards the French Revolution. My concept of an "age of enlightenment" refers to the emergence in the late 16th century Europe of a new scientific tradition which was stimulated by the contributions of earlier *Renaissance* scholars such as Galileo, Kepler and Copernicus. The scholar who opened the door towards a scientific revolution was, however, Francis Bacon because he was the forerunner of the British empiricist tradition. Sir Isaac Newton (17th century) and Rene Descartes (18th century) are the other two scholars who are often linked to the concept of scientific reductionism - ie, the methodology which forms the basis of modern scientific inquiry. It is argued in this paper that the scientific discoveries of the age of enlightenment prepared the ground for the industrial age.

A VERY FLAT EARTH

Changing times

Exactly 200 years ago Thomas Robert Malthus published an essay *On the principle of population as it affects the future improvement of society* (Malthus, 1826). England was entering the early stages of what later became known as "the industrial revolution". This "revolution" would profoundly alter its production systems, economy and social order within the span of 50 years. Far more manufactured goods were being produced than ever before, while technical efficiencies increased dramatically from one decade to another. This was achieved by the systematic application of scientific and practical knowledge to manufacturing,

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by a process of capital accumulation and by the growth of corporate enterprises. Large agglomerations (or clusters) of these enterprises developed rapidly within a few urban concentrations of industrial activity.

There was as a consequence a steady migration to the cities by thousands of rural people who were enticed by the prospect of new opportunities in these industrial growth centres. It was the beginning of a new "modern" age of innovation-driven changes and capital-based wealth creation; changes which liberated people from the confines of a specific station in life within a semi-feudal society. However, they soon faced an equally severe new dispensation, namely the class-based stratification of the new industrial society. The migrating *gemeinschaft*-oriented rural communities were suddenly confronted with the severe realities of the *gesellschaft* (contractually) stratified society in the industrializing cities (Tonnies, 1955).

A dismal future

The conditions of poverty, squalor and social degradation in the squatter camps and ghettos of early industrial England must have shocked Malthus. He postulated an emerging survival crisis for a population which, according to him, was increasing at a *geometric* rate, when the natural resources which must sustain it were increasing at only an *arithmetic* progression. These *arithmetic* increases in the natural resource base was assumed to be correlated with, firstly, the fuller exploitation of existing natural resources and, secondly, with the "discovery" of new productive regions. It was a period of territorial expansion and colonization, with the European countries - and Britain in particular - acquiring more and more real estate around the globe. But the globe sets also the limit to this expansion; ie, it confronts the "constant tendency in all animal life (which include human life) to increase beyond the nourishment prepared for it" (Malthus, 1826:2). Thus Malthus' prognosis of ultimate disaster unless there is "moral restraint" (or abstinence) in human procreation.

Malthus' view on the rate of population growth at the time was certainly not without foundation. The global population reached a figure of 500 million people around the time Columbus discovered the Americas (ca 1500). It was at the start of an age of knowledge explosion; the so-called "scientific revolution". The foundation of the modern analytical scientific method was prepared, and new competencies in a number of areas of human enterprise - such as in agriculture, medicine and manufacturing - were developed. Trade and the general level of economic activity expanded rapidly, as also the quality of life for many. As a consequence rapid population growth became a notable factor of this post-*Renaissance* period, and the global population doubled within 350 years to 1 000 million - ie, by ca 1850 (McHale, 1972). This was approximately 14 years after the death of Malthus, and 52 years after he wrote his essay on population.

A futurist living around the end of the 18th century could therefore confidently select Malthus' model as a basic framework for a prognosis of the future of mankind. It must have been "clear" to all thinking individuals of the time that disaster is looming. In terms of the best knowledge of the times there was a very real prospect that population growth would bump against the ceiling of resource availability sometime during the 19th century.

Through the looking glass

Disasters did occur, but more in the shape of human conflict and wars about issues not directly related to an impending natural resource crisis. These emerged rather in the form of the assertiveness of the new industrial powers who wanted to use their new-found wealth and technological-industrial capacities to enforce their designs over regions and populations. The Victorian-era created a "Great" Britain - an empire over which the sun never sets. "God" was an Englishman, however, a number of other "gods" were emerging in Europe, in the Americas and in the Far East. Such a world is bound to experience a "battle of the gods". This at first found expression in the form of a number of expansionary wars, and ultimately in a slow but persistent build-up of a new intense ideological conflict which was reflected in the intensification of discord between capitalism and socialism, and between the conflicting designs of nations who gained new political leverage from rapid industrial growth - thus upsetting the balance of power. One can therefore say that the great wars of the 20th century - ie, World War I, World War II and the Cold War - were the logical extensions of the technology-driven power shifts which occurred during the 19th century.

And what phenomenal innovations did occur in the world during the 19th century! The groundwork was prepared by innovations in steam power and the use of coal in iron production during the late 18th century. It took off with the application of steam power to transport and textile manufacturing. In the 70 years following the development of Stephenson's "Rocket" locomotive in the 1820s, and the introduction of rail transport in 1830 with the opening of the Liverpool-Manchester railway, the world saw a flood of ground breaking innovations such as the introduction of telegraph networks, electricity, the telephone, the internal combustion engine (including the Diesel engine), the motorcar and a large number of other innovations which metamorphosed established socio-economic practices, and life in general. Exponential growth became an accepted norm of performance, with only the rate of growth being in dispute. Even more important, the main source of economic and political power shifted irrevocably from the control of natural resources to the control of capital.

As a consequence, the industrializing world experienced a social, cultural and economic revolution during the 19th century which was at least as momentous and disruptive in its general scope and characteristics, as that of the transformations over the whole of the post-*Renaissance* period between the end of the 15th century and the end of the 18th century. In other words, the world for the first time in recorded history started to experience accelerated change. One of the best indicators of this is the explosion in the global population which occurred over the past 150 years. Within 75 years from 1850, ie, by 1925, the global population increased to 2 000 million. The 3 000 million mark was reached 35 years later, in 1960, the 4 000 million mark 15 years later in 1975, the 5 000 billion mark 12 years later in 1987, and the 6 000 millionth person was born in this year - ie, an increase of 1 000 million people within 11 years (McHale, 1972; *Population Newsletter*, No 62, 1996).

The moral of Malthus

What is the moral of Malthus for futurists? Not that Malthus was wrong as such in the approach he followed in formulating his prognosis. As was already explained, he correctly observed a disturbing increase in the rate of population growth, and the governing perceptions of the time regarding the real basis of human sustenance would have convinced any 19th century analyst that Malthus presented a very plausible prognosis of the future of mankind. Malthus was without doubt a very unique and courageous thinker for his time. However, he also suffered from a very common human blind spot in perception, ie, an inability to foresee the inter-linking consequences of rapid technological change, and the long-term implications of the shifting circumstances of his time. The moral of Malthus' story can be expressed in the following way: *When confronted with momentous changes we all tend to become "flat earth" people; we tend to formulate our view of a future "reality" on the basis of our current view and understanding of the world.*

CHARACTERISTICS OF TECHNOLOGICAL CHANGE

The primary driver of long-term change

Technological innovation is the primary driver of long-term change in society through its creation of meaningful new capacities for human achievement (Marchetti, 1981). Once a meaningful innovation is introduced into society it sets into motion a chain reaction of initiating impulses which, *inter alia*

- produces an autonomous (self reinforcing) capacity for improvement in a particular technology;
- continuously develops new fields of application for a particular technology;
- develops associated clusters of complimentary and supplementary technology, which in turn set in motion their own chain of reactions of other developments;
- creates new products, markets and industries - and destroys the old ones as the old technology, which previously supported them, nears the end of its life cycle;
- creates new professions and skills - and destroys the old ones;
- creates new power basis and power relationships within society;
- changes life styles, cultures, values and, in general, the accepted norms of society;
- increases the reach between man's power to do good things and to do evil things;
- creates the problem of growing complexity in the management of human affairs - for example environmental problems, the problem to cope with the consequences of new technological developments such as human cloning, and the problems of social degradation, corruption and alienation because a growing number of marginalized people in the so-called "Third World" find it impossible to cope with the changes they are being confronted with .

The essence of technology

Technological innovation is therefore not just a process of artifact improvement (eg, replacing Pentium I processors in computers with Pentium II processors), but implies a general improvement in the *system of competencies* within which a new technological artifact is applied. This *system of competencies* flows through the machines, procedures and processes that are used in human enterprise, the system of knowledge (or paradigm) of a society, the organizations and institutions that serve society, the industries which generate the wealth, and the state of development of a society in general.

This view of the nature of technological progress centres on a definite perception of the nature of technology - namely, the perception that it is "embodied knowledge" and not just a collection of artifacts. The word technology comes from the Greek *techne* which means skill or art, and *logos* which refers to the structure and principles of reasoning and sound thinking. Therefore, at a more practical level, we can define technology as a system of interdependent competencies which amplify human ability through the rational application of skills in the solution of practical problems.

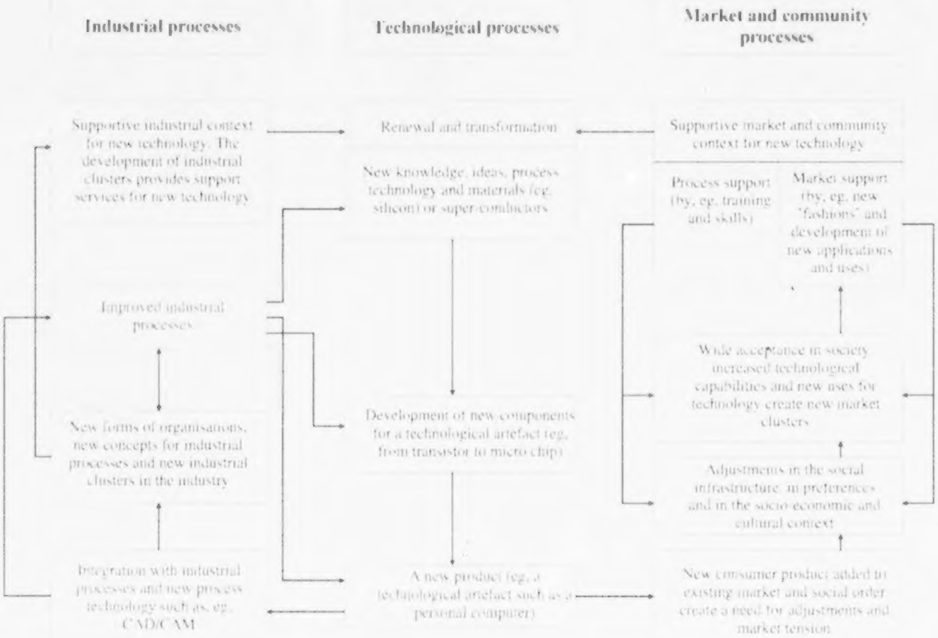
Industrial processes
Technological processes
Market and community processes
Supportive industrial context for new technology. The development of industrial clusters provides support services for new technology
Renewal and transformation
Supportive market and community context for new technology
New knowledge, ideas, process technology and materials (eg, silicon) or super-conductors
Process support (by, eg, training and skills)
Market support (by, eg, new 'fashions' and development of new applications and uses)
Improved industrial processes
Wide acceptance in society increased technological capabilities and new uses for technology create new market clusters
New forms of organisations, new concepts for industrial processes and new industrial clusters in the industry
Development of new components for a technological artefact (eg, from transistor to micro chip)
Adjustments in the social infrastructure, in preferences and in the socio-economic and cultural context
Integration with industrial processes and new process technology such as, eg, CAD/CAM
A new product (eg, a technological artefact such as a personal computer)
New consumer product added to existing market and social order create a need for adjustments and market tension

Figure 2: The strengthening cycles which spur on technological innovation

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From this definition one can distill the following notable qualities of technological progress as we experience it today, namely:

- It is centred in the mental capacity and skills of individuals, and in the knowledge base of society - ie, not in some superior collection of machines and artifacts.
- Its sustainability is dependent on continuous and well balanced human and institutional development.
- It is driven by three mutually reinforcing processes (see Figure 2), namely, industrial development, science and technology development and economic development (which translates into market development).

The MEI-evolutionary progression

The pattern of technological transformation tends to follow a *MEI-evolutionary progression* over the very long term - which underpins the so-called "ages" - and a *life cycle*, which maps the emergence, rise and decline of a particular technology.

The notion of technological evolution is analogous to that of biology; artifacts being to technology what organisms are to biology. The *MEI-evolution* refers to a shift in the dominant orientation of technology from the manipulation of Matter, to the manipulation of Energy, to the manipulation of Information (Van Wyk, 1984). The *MEI-evolution* process shaped and transformed the ages of man - not only in terms of the general characteristics of productive activities in a particular age, but also in terms of the nature of its society, its power relations and mode of operation (see Figure 3). For example, during the pre-industrial age productive activities were focused mainly on the manipulation and transport of physical things (matter), mostly by using various kinds of tools and devices which were human and animal driven. The basis of wealth and power was control over land and land resources, which by implication means that a rural gentry tended to dominate the political and social scene.

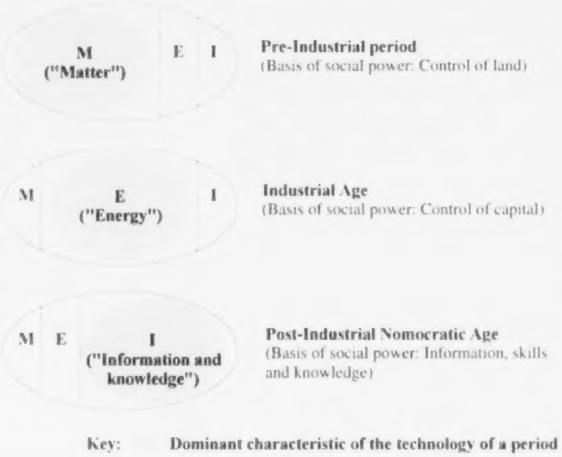
M ("Matter")
E
I
Pre-Industrial period
(Basis of social power: Control of land)
M
E ("Energy")
I
Industrial Age
(Basis of social power: Control of capital)
M
E
I ("Information and knowledge")
Post-Industrial Nomocratic Age
(Basis of social power: Information, skills and knowledge)
Key: Dominant characteristic of the technology of a period

Figure 3: The shifting emphasis of the dominant technology of a period: The MEI technological evolution

The industrial age differed from the pre-industrial period in that it introduced the use of inanimate energy (E) on a large scale in a process of mechanization. In other words, the tools and devices became machines powered by coal, petroleum, electricity and other forms of

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energy. The basis of wealth and power shifted to capital, which translated into a slow but persistent shift in power away from the formerly powerful rural aristocracy to an urban-based capitalist elite; an elite which also includes the labour union institutions and political movements with a strong support base in the union movement. An associated characteristic of the industrial age is the increased strategic interest of the industrial powers in securing control of the energy and mineral resources that are needed for their industrial growth process.

A number of authors hypothesized that we entered a postindustrial age sometime between the middle of 1970s to the early 1980s, ie, approximately 200 years after the industrial age emerged. The main distinguishing characteristic of this emerging age is the growing importance of knowledge and information systems in everyday life, and particularly in economic progress (see Figure 4). Within the context of manufacturing one observes a growth in automation; machines have become automata. Within the context of organizations one observes, firstly, a systematic increase in the scope and complexity in applications of information systems, and secondly, a slow but persistent shift in the locus of organizational power from the capital/labour axis to those individuals with the necessary skills and knowledge.

AGE IN HISTORY	MODE OF PRODUCTION	NATURE OF SOCIAL POWER
Middle Ages (until 14th century)	Agriculture and artisans	Church and landed gentry
Renaissance (until 16th century)	Commerce, agriculture and artisans	Merchants, city states and landed gentry
Age of Enlightenment (until 18th Century)	Commerce, agriculture, artisans and small manufacturing	Merchants, landed gentry, nation states
Industrial Age (until 20th Century)	Manufacturing	Capital, labour in nation states
Post-industrial Nomocratic Age	Services and networking	Embodied "capital" (knowledge, skills and information in global society

Figure 4: The shifting emphasis of social structures and processes during the second millennium

Therefore, while the information age is creating incredible new capacities to communicate and interact, a new powershift is once again occurring. Control over land and capital is becoming progressively less important, and the mastery of knowledge and information systems more important. Moreover, in this new world order the role of the skilled and trained individual as the "holder" of the new empowering resource of knowledge generation becomes ever more important, while the individual as manpower resource becomes ever less important. As a consequence, this new world order spells a widening gap between the "haves" (of knowledge, skills and information access) and the "have-nots". A few more observations on these issues are presented later in this paper.

The technological life cycle

As was mentioned previously, the life cycle maps the emergence, rise and decline of a particular technology such as railroads or steamships (Modis, 1992:55-72). Technological development normally follows an S-shaped pattern which indicates an early stage of emergence (as the technology is established), a stage of rapid growth (as the technology becomes institutionalized within society), and a stage of maturity and decline when the traditional market of a technology starts to decline as it becomes infested with new innovations which differ qualitatively from the older one (see Figures 5 and 6).

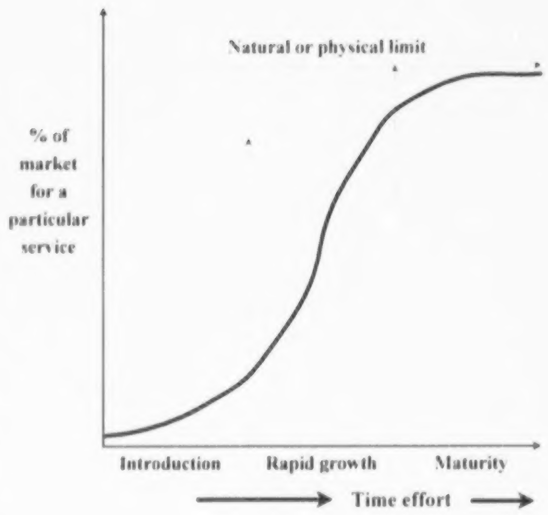

Figure 5: **The S-curve of technological development**

Figure 6: **Competition between transport infrastructure expressed as a percentage of the total length of all transport infrastructure in use in the United States in a particular year**

Source: Modis, T. 1992. Based on the work of Nakicenovic, N. 1988. Dynamics and replacement of US transport infrastructure. **In** Ausubel, JH & Herman, R (Eds). 1988. *Cities and their vital systems, infrastructure past, present and future*. Washington DC: National Academy Press.

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We differentiate between smaller shifts in the market place when new "models" of a particular technology replace the older ones, and the introduction of a new empowering technology which initiate groundshifts in the social order. For example, General Motors' innovation during the 1920s was to produce cars which differ fundamentally in design and colour from Henry Ford's black Model-T Ford. By doing so they opened a new direction in motoring, and succeeded to destroy the market for Model-T Fords. Model shifts have a short-term cyclical impact on socio-economic development. In contrast, the impact of a new empowering technology can be considerable. It tends to rewrite the rules of socio-economic development, producing in the process clusters of development and new industries, which in turn set in motion a wave of innovation and economic growth.

The phenomenon of long cycles in economic activity was described by the Austrian economist Joseph Schumpeter as "a gale of creative destruction" (Schumpeter, 1947:81-86) following a 50 year cyclical pattern. Schumpeter was fascinated by earlier observations by Jevons (in 1884), by the Dutch economist J van Gelderen (in 1913), and the Russian economist ND Kondratieff (in 1926) - who is perhaps the best known through the popularization of the "Kondratieff long cycle" (see Ayres, 1990, Part I:1-3). More recent studies by J Forrester - who applied systems dynamics modeling to the study of industrial growth processes, also indicated the existence of a long wave of approximately 50 years in duration (Forrester, 1976).

WAVES OF CHANGE: THE FOUR MAJOR TRANSFORMATIONS OF THE INDUSTRIAL AGE

More recent research into the implications of technological innovation have identified four definite technology-based long-term cycles of innovation, growth and stagnation over the past 200 years - ie, over the period that was earlier described as the "industrial age" (Marchetti, 1981; Ayres, 1990; Modis, 1992; Linstone & Mitroff, 1994). These seem to substantiate the earlier findings of Jevons, Van Gelderen, Kondratieff and Schumpeter. The following overview presents a summary of some of the most salient characteristics of the four innovation waves (or quarters) of the industrial age, as discussed in the works of Ayres, Modis and Linstone & Mitroff. For the purpose of simplification the industrial age is identified as the 200 year period between the 1770s and the 1970s.

The First Wave, the 1770s to the 1830s - Coal, iron and cotton textiles

The first transformation towards the industrial age occurred in the last quarter of the 18th century, ie, a shift away from the industrializing nations' dependence on charcoal and water-power to the large scale use of coal for energy. This required a quantum leap in the capacity for mass transport in these rapidly developing economies, which was initially met by the building of vast networks of canals which linked the major rivers of industrializing nations such as Britain. The canals were primarily used for the transport of coal, and were extremely profitable for a period of 50 years - ie, until the 1830s.

The steam engine gradually made coal-based energy available as a rotational motion, which increased the scope of the application of coal power, both spatially and functionally. As a

270

consequence this stimulated a need for improvement in the materials that were used to build steam engines, and also created vast improvements in manufacturing capacity for all kinds of goods. Two other major innovations during the last two decades of the 18th century coincided with the switch to coal during this period, namely an important new textile material, cotton, and a new structural material, wrought iron. These two products became progressively cheaper and more widely available (Ayres, 1990:3).

Improvements in iron technology, in steam engine design and in machine tool technology, made coal-fired energy widely available as the primary source of rotational power for manufacturing. At first stationary coal-powered machinery supplemented water power to drive factory machinery, and finally they replaced water power. Then mobile coal-powered engines started to supplement horse and wind power. The widespread application (or diffusion) of steam power in transport was the key that opened the second technological transformation of the industrial age: It produced railroad transport. By the 1830s rail transport became technologically and commercially viable, and the monopoly of the canal system on the transport of heavy materials was broken. It initiated a rapid decline in the profitability of the canal systems, which in turn resulted in heavy losses in nominal wealth for the holders of canal shares between 1838 and 1843.

The Second Wave, the 1830s to the 1880s - Railroads and steamships

The advent of rail transport resulted in a massive construction boom in industrializing nations such as Britain - which was a significant factor in the recovery of that nation's economy after the recession of the early 1840s. Railway construction also provided a strong impetus for the expansion of iron production. the development of better iron making technology (such as the hot blast technique) and, ultimately, the development of steel. Railways also triggered the creation of telegraph networks. Moreover, the availability of efficient transport infrastructure, and the development of coking technology, stimulated the innovation of gas-lighting in the second half of the 19th century.

The powerful impact of the railway on middle 19th century Europe is best illustrated by the 1838 comments of Friedrich List, who was at the time a consul for the United States of America in Germany. He wrote the following (Ebeling, 1995:14-15):

> *"In order to foresee the full effect of such developments, imagine that every country and every noteworthy city in Europe is linked by railways and steam boats, and that services are so regular and such improvements and savings are made in transport operations over the next 25 years that it is possible to reduce the transport charges. Moreover, consider that the average speed of travel will soon be 37 to 45 kms. per hour, and that one will therefore easily be able to cover 450 to 562 kms. on summer days. If we were to examine each social class in turn, we would be astonished at the influence such a transport system must necessarily have on improving the situation and productive capacities of each and every individual. The doctor, the solicitor, the scholar, the artist will henceforth be able to extend their sphere of activity to distant cities and countries. A great actor, for*

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> *example, will be able to appear on stage in Berlin today, Hamburg tomorrow, and Hannover the day after tomorrow. A Saxon manufacturer who hears of new discoveries in his field in Paris and in London, will be able to visit these capital cities for a modest sum and will only require 5 to 6 days at most for the whole trip. A new invention is all the more important and beneficial the more it affects the well-being and education of the working classes. According to this yardstick the railways are the greatest invention of ancient and modern times; they are true engines of public welfare and education."*

The Third Wave, the 1880s to the 1930s - Steel, petroleum, the motorcar and electricity

The third wave of change started with the emergence of the petroleum industry, the substitution of steel for iron as an engineering material (being itself a spin-off from the railway's increasing need for more resilient metallic products), and the innovation of electricity and the internal combustion engine. These innovations, and also developments in the gas-light industry, provided the initial feedstock on which the rapid development of the chemical industries was based. Moreover, the growth in the use of textiles resulted in an increased demand for dies, soaps and bleaches, and a growing demand for illuminating oil created a refining industry. These developments helped to stimulate innovations which led to development of the internal combustion engine.

Just as in the case with coal, iron and cotton in the 18th century, these developments also had a immense stimulatory impact on the economies of the industrializing nations. It resulted in a spurt of new infrastructure development. This overlapped with the tail-end of railroad construction which peaked around the second to third decades of the 20th century. A combination of the innovation of electricity, of the telephone and of the motorcar created vast new growth industries, and transformed the life styles of millions of people in the industrialized world. A synergism between road networks and telephone networks - and the development of mass road transport services - allowed for a dramatic decrease in inventories as from the 1920s (Ayres, 1990:4). Clusters of other and associated innovations during the late 19th century include, *inter alia*, deep freezing, artificial fertilizers, sewing machines, bicycles, photography, moving pictures, the first electrical appliances, etc.

As was mentioned earlier, the increased rate and reach of industrialization not only changed the shape of society, but also the shape of societal and political power in the industrialized world. New "gods" appeared on the international scene, thumping their breasts while staking out new claims on territorial hegemony. During 1914 this transformed into the 20th century's first cataclysmic event, ie, the four year long World War I. Despite the huge losses in economic infrastructure and human life, this so-called "great war" also produced important technological spin-offs, such as new aircraft technology and heavy road transport technology, as well as new approaches towards large systems management. World War I represented an important turning point for industrialization as a socio-economic process. It established the terms of reference for a new global order where industrial power reigns supreme - ie, the struggle for the control over capital representing the real struggle for power in society. By the

1920s the world had changed, figuratively speaking, into a "machine" (Mumford, 1990), with various sectors of global society interacting with each other in a vast network of political, economic and societal interdependencies. By the end of the 1920s this "machine" came unstuck in a "great depression" which contributed towards the second cataclysmic event of this century, World War II. It also sounded the end of the third wave of the industrial age, and opened the path towards a fourth wave of innovations.

The Fourth Wave, the 1930s to the 1980s - Pent-up consumer demand, aircraft, materials technology and electronics

According to Ayers (1990:5-6) the great depression, followed by World War II, resulted in vast accumulation of savings and pent-up consumer demand. This pushed the postwar period of sales expansion, involving much the same goods and services which fueled economic growth during the last phase of the of third wave of the industrial age. However, some of the first signs of the coming "nomocratic" world (where knowledge generation becomes the basis of power) appeared on the horizon. There was a slowdown in the demand for steel, which was roughly compensated by an increased demand for aluminium and plastics. A large number of new chemicals, and processes to produce them, appeared on the market. New detergents, synthetic materials, synfuels, synthetic rubber, polyesters, acrylics, polyethylene, and many other creations of the human mind, flooded onto the market place. This was an early indicator of the now well established trend which points towards a decline in the relative importance of basic materials and minerals as a proportion of total manufacturing value added.

A second area of development during the fourth wave of innovations was that of electronics. Building on discoveries such as that of Maxwell (in 1860), Hertz (in 1887), and Marconi (in 1896) - and other developments such as the vacuum tube biode early in the 20th century - the electronics industry took of with a vengeance after World War II. The radio and television industry, and the associated services, expanded rapidly and became a powerful feature of the daily life of people around the world. But these developments pale into insignificance when compared to the growing dominance of computer technology - especially after the innovations in solid state electronics since the 1960s. It can rightfully be claimed that the development of the high speed electronic computer was the key towards a large number of associated innovations in space technology, new developments in materials technology and bio-technology in the 1970s.

A third area of innovation of the fourth wave was in the field of air transport. Again, building on developments that had already started early in the 20th century, air transport rapidly developed a dominance in the market for mass passenger transport since the 1960s - cutting into the markets of the passenger train, long haul bus services and the passenger ocean liner. Within the short period of two decades since the 1950s the global passenger transport scene changed radically, and the world was suddenly much smaller. Together with the innovation of electronic media and the growth of computer networks, this prepared the stage for the emergence of the global citizen in an ever shrinking postindustrial world.

THE POSTINDUSTRIAL AGE: TOWARDS A NOMOCRATIC WORLD

Let us now return to the hypothesis, presented earlier in this paper, that the world entered a postindustrial information age sometime between the late 1970s and the early 1980s. The word "postindustrial" first appeared in print in 1917 (Nelson, 1996:479). However, the first comprehensive review of the concept appeared in *The Coming of the Postindustrial Society* by Daniel Bell which was published in 1973 (Bell, 1973). According to Bell the economy of this new society will be marked by a change from a goods producing economy to a service economy. Socially it will be marked by the pre-eminence of a professionally and technically skilled class, and in decision-making by the creation of new kinds of "intellectual technology". Other related concepts which also appeared in print are "information society" (Naisbitt, 1984), "service society" and "knowledge society" (Drucker, 1969).

Another description of an emerging postindustrial world is that of Kostoupolos (1988) who refers to a "nomocratic society" where knowledge is not the servant of the people but in fact the master. "Intelligence" is, according to Kostoupolos, its specific "labour force". It incorporates (and integrates) human cognitive qualities, artificial intelligence, stored knowledge and information networks. He argues that knowledge would be the "axis" of a future (postindustrial) nomocracy, just as landed estates represented the "axis" of the pre-industrial world, and capital that of the industrial world.

Others, such as Senge (1990) and Marchetti (1981) write about "learning" organizations and "learning" societies. The essence of such societies and organizations is the need to remain competitive (in order to survive) in a world dominated by high rates of innovation. There is therefore a need for continuous improvement and renewal.

A few trends pointing towards the emerging knowledge and information based postindustrial world

Under the heading "Information Society" Ruben Nelson (1996) presents a few interesting pointers towards a changing scene and its possible implications:

- In 1954 only 20 computers were shipped to customers, and only 160 computers were in use in Europe in 1958. In contrast, by the early 1990s 140 million computers were in use worldwide and 400 million microprocessors were imbedded in motorcars, telephones, televisions, and in a number of other appliances. By 1994 the Internet had over 30 million users worldwide, and this figure is growing rapidly.
- In the mid-1950s, approximately 80 percent of the cost of a new motorcar represented wages and materials. The cost of services and information accounted for the rest. By the mid-1980s these ratios were reversed, ie, 80 percent for services and information.
- By 1991 computer hardware and software exports from the United States amounted to R250 billion, which was more than double the value of motorcar exports.
- One can now add to these trends the now well known statistic of a doubling in the computing capacity of computer technology every two years

271

Nelson points towards a few important implications of the onset of a knowledge based world order, namely:

- The need for a new epistemological foundation - a new understanding of what knowledge is, how it is created, how it is validated and what its economic role is in an age based on the concept of knowledge and information (ie, in the same way as there was an understanding of the role of land in the pre-industrial world, and of capital in the industrial world).
- A challenge to put knowledge to practical use - which refers to a growing threat of being drowned in a sea of useless knowledge (or educating the unemployable).
- A growing preoccupation with the formulation of subcultures for self-critical learning and self-monitored performance - which represents a return to the concept of community (but this time around within the context of *nous*), emphasizing the need for learning as an enculturalization process.
- A growing difficulty of effective governance as unconvinced minorities undercut majority decisions because they are progressively better informed, and have the ability to utilize informal networks and the media

New rules of the game

It should be obvious that a new knowledge- and information-based world order will be based on different premises and rules for the effective management of organizations and societies. A few pointers towards the likely nature of this shift are presented without defending the particular position, ie, it is suggested that the coming information and knowledge-based world order means:

- A systematic shift from machine and organismic based organizational forms which are centrally directed, towards team based participative organizations in which the individual plays a pivotal role (Ackoff, 1994).
- At the level of national governance, a shift from representative democracy towards participative democracy.
- The demise of centralist institutions (structured around specific value chains) which emerged during the industrial age, with a growing emphasis on organizational learning and adaptability - and thus the decentralization of services and management structures (Evans & Wurster,1997).
- A growing need for effective global governance (but not more global control) through improved information flows and communication.
- A need for continuous improvement in the access to effective knowledge and information - especially of importance for the survival and development of the less developed parts of the world.
- A growing need for a fresh approach towards the management of complexity - such as, for example, applications of social systems sciences in problem solving.

- A growing need for the exchange of ideas, skills, knowledge and information, locally and globally, and the emergence of a global *noitic market* (after the Greek *nous*, for mind).
- A relative decline in the power of the nation state because progressively more of the state's economic powers will be affected by the global integration of the international capital market, by electronic transfers dominating international capital flows, by the international electronic media and communication systems, by the "global factory" and "global market place", and thus by the growing need for international competitiveness - which in turn sets the specifications for the most appropriate (or globally acceptable) social and economic order for a country (Ohmae, 1995).

CONCLUSION

This paper argued that the world is today entering a new age which will, in all likelihood, be as different from the industrial age as the industrial age was from the pre-industrial period. What the ultimate nature of this new world order will be is still unclear - in many ways we are again "flat earth people". We can only detect the outlines of the patterns of change that we are facing. Therefore, like Malthus, we are running the risk of building our scenarios of the future around extrapolations of our current perspectives and experiences, while we should also consider the full (interlinking) implications of the trend breaks and groundshifts that are certainly to follow with the coming of a "noitic age".

What we do know, however, is that the quality of our management of global affairs over the next 20 to 30 years will determine our success in gaining the most from the exciting promises offered by a knowledge and information driven world order. This much we can learn from our experiences over, especially, the past century. The industrial age produced great wealth, and even welfare, for the industrial nations. Hovever, it also produced a number of serious imbalances and inequities in the world - imbalances and inequities which threaten to destroy all the good things that flowed from global industrialization. For example, the full benefits of 200 years of technological innovation were enjoyed by only one quarter of the global population. More in particular, it would be important to find solutions to the following four vexed problems of global governance:

- Given current trends, the global population is expected to increase from 6 billion to 10 billion within 50 years, while at least 90 percent of the additional 4 billion people will have to subsist in severe poverty, not being able to enjoy the fruits of the coming dispensation (unless something is done about their situation, which will, in turn, have a positive effect on the prognosis of unbalanced population growth).
- The global environmental threat is something that will remain with the coming generation for a period of at least another 50 years - that is even with the shift towards a post-industrial world order and growing environmentalism in the world - because of the current imbalances in the global distribution of economic development and wealth, with a real possibility of rapid increases in air, water and land pollution as the share of the economic wealth of the new industrializing regions increases.

- There is a growing threat of political imbalances in the now rapidly developing "Third World" - ie, the kind of imbalances experienced in the industrialized world over the past century - and this may well become the most important threat to global security over the next 50 years when regional "demi-gods" start to flex their new-found muscles.
- There is a growing threat of "scientism" as human ability to make shattering new discoveries outstrips the wisdom to apply this new knowledge wisely - a threat which is compounded by growing fragmentation in the process of scientific inquiry, and especially the seemingly growing divide between the humanities and natural sciences.
- A lack of understanding of the nature and workings of complexity (Cilliers, 1995) may well be our undoing when society and nature rebounds in unexpected ways, producing new kinds of social pathologies and new mutants of old diseases or environmental problems - mutants and problems for which we may find no effective cures and solutions.

Hopefully a post-industrial "noitic age" could offer the solutions for these potentially disastrous trends because of the increasing effectiveness of knowledge and information-systems. Human beings function according to their perceptions, which will hopefully be affected by a better insight and understanding of the important implications of these issues.

The shift in the basis of organizational power towards "embodied wealth" - ie, a shift towards skills and the competencies of the individuals in the organizations - holds another important message for the "merchants" of knowledge and information. The mode of transferring wealth in this coming "age" will not be through the transfer of capital or funds, but through the distribution of information, knowledge and skills to the less fortunate sections of society. Similar to the industrial age (capitalist/socialist) debate on the control over capital, one should, therefore, also expect a new and intense debate around the concept of social equity in the access to information, knowledge and learning (the "noitic market") within society - globally and locally. Relevance and effectiveness will be the key standards of performance of this "noitic market", and the measure of success will be improvement in human development. The responsibility of the "merchants" of the "noitic market" will be to design the strategies and the systems for education and information which can accomplish this.

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275

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IATUL

RELEVANCE FROM REALITY

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Introduction

Lifelong learning has been recognized as a key issue for both individuals and organizations in staying competitive. Learning new skills and maintaining the obtained knowledge has become acknowledged as such an important issue that business companies and public organizations have started to add human resource accounting to their financial data. At the personal level, lifelong learning sometimes requires taking a long step in a new direction -- perhaps even to a new profession. More often it means, however, updating the personal knowledge required for the successful accomplishment of everyday tasks.

Learning new skills and updating old ones can be obtained by attending formal or experiential educational opportunities. There is an abundance of education offered to those willing to study. The methods vary from short seminars and lectures to entire academic programs. Although lifelong learning is usually considered to mean studying in educational organizations, I broaden the term to include all different ways of learning. For some people, learning by doing is more suitable and I think it will, in certain cases, lead to the goal -- increased competitiveness and better working motivation -- just as well.

I still remember my enthusiasm when I first heard Dr. Leenamaija Otala talk about lifelong learning in the 1992 FID Conference in Madrid. She names skills, creativity, speed, flexibility, and dedication to work as key issues in competitiveness. According to Dr. Otala, Japanese society is a good example of lifelong learning, because the public school system gives a good basic education and companies spend time and money in continuing education.

Dr. Leenamaija Otala also states that everybody is responsible for their own competitiveness. Therefore, it is essential that we as information professionals use every opportunity to develop our skills. With this attitude we keep our everyday work from becoming routine which causes frustration and prevents creativity.

Background

The arguments in this paper are based on my personal working experience in different organizations. Mostly I concentrate in my latest sojourn in the industrial sector.

My career in the information field started in 1984 when I got a job at the Technical Research Centre of Finland (VTT) to be trained as an information specialist. That was my first step into lifelong learning after graduation. For two years I worked in the Information Service of VTT and attended a nine month course at the Centre for Continuing Education that is now called The Lifelong Learning Institute Dipoli of Helsinki University of Technology. The principles of its functions are still the same: The Institute organizes courses and professional development programs in fields within the expertise of the university. In those days, many information professionals in Finland started their careers in the Technical Research Centre and it was common that they left VTT after a some years to work in industrial companies.

In 1986 I was offered a job in the information service of Imatran Voima Oy (IVO), a large Finnish power company. This experience in the industrial sector lasted until 1990 when I moved to Lappeenranta and started working in the University Library. Energy technology has always had a major role at Lappeenranta University of Technology (LUT). Many of the LUT students work in IVO for the summer or do their diploma thesis there. I really felt that I had something to give to those students whom I now served in the Library. In addition, Lappeenranta University of Technology also has a long tradition in combining technology with economy. Experience with an industrial information service also helped me understand the information needs of the students in the Department of Industrial Engineering and Management and later the Department of Business Administration which was founded in 1992.

In early 1990's, Finland was hit by a severe economic depression. Financial sources seemed to completely stop. For years no one changed jobs or had courage to look for something new to do. The University had economic problems as well. It was difficult to finance even normal functions and even harder to get funding for traveling or education no matter how essential it was. Many things had to be done the hard way because of a shortage of money. Among the employees, including me, there was a social demand for something refreshing.

Working in an industrial information service

In the spring of 1997 one of the information specialists of UPM-Kymmene Corporation at Kaukas, Lappeenranta left her job to substitute as a market analyst in the Business Development Department of the same company. UPM-Kymmene is one of the largest paper and pulp manufacturing companies in the world. The Kaukas information service needed a secondment to take care of her tasks. In this situation, I was offered a chance to gain new experience in the forest industry and update my knowledge of industrial information services at the same time. The possibility to trade jobs for a relatively short period was interesting and I expected to gain a lot of new ideas for my work serving the library customers and teaching the students information retrieval.

The LUT Library serves undergraduate and postgraduate students, those participating in continuing education, researchers, students from other local schools, industrial companies, and the general public. The Library staff is already very busy and therefore it was obvious that an eight month period without one information specialist would be impossible. However, a professional information specialist was willing to be my substitute and I could start my eight month "lending period."

Differences in the working tools

There was very little time to become acquainted with the job. During one afternoon my colleague, who I was supposed to substitute for, and I went through the most important tasks and concentrated on those that were the most unfamiliar to me. That was like was jumping onto a moving train but I really enjoyed it.

In the "mechanical" part of the new work the biggest difference was the software with which I was completely unfamiliar. Instead of using Word or Word Perfect for word processing I had to learn Ami Pro. For telecommunication I had used Reflection but my new computer was equipped with Procomm Plus. LUT uses a teamwork software called GroupWise while the UPM-Kymmene Corporation has chosen Lotus Notes. The benefit of all this was that I really had to think about how software works and what it is used for. Basically, all programs have the same properties but they work a little differently. The various actions just had to be found.

The Internet is not nearly a widely used in the business world as it is in universities in Finland. It took weeks before I was allowed an Internet connection. In the UPM-Kymmene Corporation data security is taken very seriously and all Internet connections go through a firewall computer. The firewall slows down data transfer. Therefore, all online searching is done by using a modem using the traditional command languages. The online host WWW-pages are not used at all.

With access to the Internet I was able to share my experience with customers. I also had many opportunities to teach end-users how to use search engines like Alta Vista or Infoseek or where to find relevant information. In searching in the Internet, some of the requests were not within my previous expertise. Once one of the company doctors was writing an article about electronic information sources in the field of occupational health and he came to interview me on the subject. I had to study the subject carefully before the interview. Afterwards, I promised I would give a lecture to the other doctors and occupational safety personnel on the subject. I was pleased to do it, although it was three months after my return to the University.

Internal databases are very important and widely used in UPM-Kymmene. Lotus Notes gives excellent possibilities to share information with people in different locations all over the world. In a business environment, information must be delivered quickly and accurately and for that purpose databases with restricted access work wonderfully. In the late 1980's when I worked for IVO there were already some internal databases in use but the software was not yet very sophisticated. In the universities they are used mainly for admistrative purposes or to store research information.

Differences in searching

In the University Library the number of online searches has decreased during recent years while end-user consulting has become a more and more important part of the information specialists' work. In UPM-Kymmene both managers and employees request searches instead of searching themselves. I really enjoyed "real search language", complicated profiles, and powerful search tools which are rarely used in e.g. CD-ROM databases. I could also refresh my knowledge about those online databases that are seldom used in university libraries. For example, risk reports are never retrieved because of their prices, but they are very important to companies.

In a public information service, all searches are confidential. Therefore, very little information is stored about the subjects or profiles. In companies it is different. For example, in the company I worked in, information about searches was stored in an internal database in order to be used if something needed to be checked or someone asked the same question later. Also, for other repeatedly occurring questions, there are internal files to fulfill information needs.

There was also a change in the subject category of search requests. In the University most questions deal with different technologies but now I was responsible for business information. That included both online searching and SDI's. News data were a new responsibility to me and I spent long hours e.g. with the Reuters news service trying to figure out problems in both technical matters and subject categories.

Differences in indexing

The Kaukas information service has its own electronic library catalogue and other related databases based on TRIP. They have their own keyword lists for indexing. I understand why this method has been chosen: it requires less work to create or update. Moreover, there are actually no suitable classification systems for forest industry literature. The UDC which is used in university libraries in Finland is too general. But I really missed the benefits of a hierarchical classification.

At first I did not know the vocabulary very well. Therefore it took time to index the material. In addition to books, research reports written by the company's own research staff were also indexed and marketing surveys were even abstracted. The amount of acquired material was much greater than I had expected.

Back to the University

At the beginning of this year I returned to my position in the University Library. Again I jumped onto a moving train only this time the speed was not as fast because of the holiday season. I had a few days to stumble with forgotten passwords and lost UDC skills.

I have now had four months time to think about the benefits of my sojourn. Firstly, I am very happy because of the break in a succession of busy years. The time in Kaukas was just as busy but in a different way. I am also very pleased to have had new colleagues who welcomed me warmly and made me feel as a part of the team even though I was a temporary worker. The good personal relations have continued regardless of the different organizations.

The experience gave me a deeper knowledge of the forest industry in general and the paper industry in particular. Now it is easier for me to communicate with the customers - students, researchers, and business information services - in that field. Now I also know much more about the business environment that our students enter when they graduate. It has changed a lot during the last seven or eight years. I have noticed that students and their teachers really appreciate hearing about the possibilities that modern business information services offer. It also pleases me to be able to advise future engineers and economists about the reality they face in the near future.

The cooperation between the University and UPM-Kymmene Kaukas has always been very strong. The University Library and the Kaukas information service have also had close connections over the years. Some members of the staff at Kaukas teach or study at the University and many of the former LUT students work for the company. They have now found their way to me in the Library probably because they feel I speak "their language".

The skills I learned and the knowledge I was able to update are also very important. The fact that my customers at Kaukas asked different questions than the customers at the University gave me an opportunity to examine many databases that I don't normally use in the Library. Also, the contents of business related databases became familiar to me. I try to transfer as much as possible of this knowledge to the students during our tailored information retrieval courses.

Conclusions

The only stable thing in life is change. To stay relevant and competitive in today's world we must keep up with it. In university libraries and in particular in technical university libraries it is essential that information professionals know the reality where they send their students after graduation and where their customers live. This knowledge can be acquired by staying in close relationship with the business world. Changing jobs can be one way towards that goal.

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Back to contents

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IATUL

TEACHING AND LEARNING MODELS IN THE 21ST CENTURY: A TECHNOLOGICAL RESPONSE

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ABSTRACT

This paper will focus on technological innovations employed and planned for user education and general library services within our institution as well as throughout academe. It will describe the development of electronic classrooms and multimedia classroom, and some of the ways in which Tech Commander and similar tools are used to help facilitate effective teaching in a technological environment. The outline will include research and strategies relating to Internet instruction, teaching college students to be peer PC tutors, teaching methods, learning styles in an electronic environment, and trends and issues based on a review of the literature and practice. It will emphasize strategies for working with novice and sophisticated library users.

Our University has advanced from more traditional models of teaching to sophisticated technological methods as electronic, smart and multimedia classrooms have increased at the University. Within our building alone, we have over twenty workstations for public use and a multimedia classroom that make available over twenty networked indexes, specialized subject-related webpages, and the world wide web. In addition, we have several full-image, full-text databases that are used extensively. So, that I will be able to speak both from a theoretical and a practical perspectives.

Back to contents

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IATUL

REMOTE ELECTRONIC RESOURCES AND THE OPAC : ILLUSTRATED BY THE UNISA LIBRARY EXPERIENCE

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We would like to share Unisa Library's experience with cataloguing remote electronic resources with you. The Library has faced many changes during the past two years, among them the creation of the GAELIC Consortium, conversion to USMARC and the implementation of the INNOPAC Library system. The cataloguing module only came into full operation in February this year. All these events contribute to the Library being able, for the first time, to make meaningful decisions about the handling of Internet resources.

In my contribution to our combined presentation today, I would like to indicate why we decided to add references to remote electronic resources to our Online Public Access Catalogue, the policies and criteria we thought necessary to support this decision, the changes in workflow that resulted and the way that we deal with the bibliographic descriptions of these resources. My colleagues will discuss the organisation of their intellectual content and keeping the URLs up to date.

Bibliographic access : policies and procedure - Van der Merwe, Ina

Introduction

The Internet has been described as a vast and ever-changing reservoir of information with no central locus of control and librarians are acutely aware of the fact that within this maze of intangible, virtual resources, valuable research materials are being made available almost instantaneously all over the networked world. An increasing number of journals are also appearing in electronic format, though some are still accompanied by the printed version.

In addition, the Web has become accessible to anyone who owns a computer and modem and customers with sufficient time, persistence and resources are not dependent on the library any longer to obtain the information they seek. It has in fact, became quite feasible for the library customer of old to develop a personal customised collection. These demands on the Library require a new role for the librarian, from someone who traditionally acted as a gatekeeper to the collection to that of entering into a partnership with customers. Librarians have realised that, in order to stay relevant and to prevent customers from bypassing the library, ownership and access seem to be the way to go. The Unisa Library decided that the OPAC should also be used as a gateway to metadata repositories on the Internet. This will result in the Library's catalogue no longer being merely an inventory of what the library owns, but also a means of access to selected remote resources.

Policy and procedures

In order to make this possible, we needed to formulate a policy and to identify criteria for guidelines about providing access for remote electronic resources.

We decided that bibliographic references for the following Internet resources would be included in the OPAC:

- electronic journals;
- electronic text files;
    - full text bibliographic information on the library database network;
    - recommended material for Study Services;
    - reference tools;
    - significant electronic research tools;
    - online manuals for professional use;
- online databases;
- digital images;
- Unisa campus websites;
- mailing list discussions which are refereed and cover topics of scholarly interest.

The criteria that they need to meet is necessary to ensure their relevancy for teaching and research at Unisa. The policy furthermore requires that URLs are to be linked-checked and that no printed copies for accessioning purposes are to be made.

It became apparent that the new project would require input and support at all levels and new procedures regarding workflow issues had to be established. This boiled down to close co-operation between subject librarians, IT specialists in the library, serials librarians, cataloguing staff and staff from our Department of Computer Services.

Once an Internet resource has been identified and selected for cataloguing, a printout of the opening screen of the document together with a clear indication of the URL and information on the method of access, the size of the file and possible restrictions for the user, is sent either to the serials librarian depending on whether it is an electronic journal or not, or to one of the cataloguers who for the time being will be responsible for the creation of the surrogate which will display in both catalogues. The text-based OPAC does not support hypertext links and the Internet address on the bibliographic record can only be viewed by the user. However, the web-based catalogue available on the Internet through the University Homepage provides a gateway to the resource through a hypertext link in the record.

It is probable that electronic resources will be incorporated into regular library processing procedures in future.

Standards

At present there is no international standard for the description of metadata. An experiment on the cataloguing of internet resources was conducted by OCLC in 1992, to test and verify the applicability of the second revised edition of the Anglo American Cataloguing Rules and the use of the USMARC Bibliographic Format. With the addition of an 856 field in the MARC format to accommodate the electronic location and access information, in other words the Internet address, these standards were judged sufficient for the cataloguing of these resources. [1, 2] Although we are aware of other metadata schemes such as the Text Encoding Initiative (TEI) and Dublin Core, we decided to adhere to the same standards that are used for the description of conventional library material. In addition, we make use of the twenty first edition of the Dewey Decimal Classification scheme, the Library of Congress Subject Headings , other authoritative documents and the guidelines set out in the Core Bibliographic Record for Computer Files.

Bibliographic description and special problems

In dealing with the description of remote electronic resources, three elements are needed:

- the bibliographic description;
- the access points, both descriptive and subject related;
- an Internet address or Uniform Resource Locator [2]

This is not as straightforward as it sounds, as Internet resources present special problems of their own, namely:

- **Virtual items**
  Cataloguers are dealing with virtual resources. There are no physical items to be examined, as the description is based on a collection of bytes in a computer's memory.
- **Lack of stability**
  They could furthermore be described as moving targets [4, 5] as these resources lack stability. Cataloguers are constantly confronted with decisions about the updating of bibliographic records to match the current state of a resource which can be changed at any time by the homepage owner. The same applies to the URLs which can become invalid without notice. In such instances, the record could just as well be deleted from the catalogue.
- **Restricted access**
  Although many Internet resources are available free of charge, most commercially published electronic journals incur subscription costs like their print counterparts and this can lead to restricted access for the user. Such information needs to be included in the bibliographic description.

Bibliographic record as displayed in the text-based OPAC

CORP AUTHOR	University of South Africa Library.
TITLE	University of South Africa Library [computer file].
FILE INFO	Computer data.
PUBLISHER	Pretoria : University of South Africa Library, 1997.
E-ACCESS	Link to this electronic resource on the Internet http://www.unisa.ac.za/library/index.html
http://purl.unisa.ac.za/oasis/socsci/19563991	
SUBJECT	University of South Africa. Dept. of Library Services.
NOTE	Title from opening screen.
SYS DETAILS	Mode of access: World-Wide Web.
CONTENTS	About the library--Electronic information resources--Training--What's happening--Information for students--A selection from the Internet.
SUMMARY	Profiles the library at the University of South Africa as one of the largest academic libraries on the African Continent. Provides a brief history of the library; the library's mission statement which stresses customer focus; the size of the various collections; the library services and resources available; highlights its multiskilled personnel and their responsive attitude to technological innovation, and the library's supportive function in the University's role as a distance education institution. Provides links to relevant Internet sites.

```
+-----------------------------------------------------------+
|       LOCATION          CALL NO          STATUS            |
|1      Internet          Online           AVAILABLE         |
+-----------------------------------------------------------+
```

Figure 1

In the above example, Figure 1, we see the bibliographic record or surrogate for the Unisa Library Homepage as reflected in the text-based OPAC. Note the indication of the broad class of material or **GMD** to which an object belongs, enclosed in square brackets, following the title proper.

All items on the Internet are considered published. [6] In cases where no formal publisher statement is given, this information can be derived from the server portion of the Internet address. [7]

As no physical item is being catalogued, it is not necessary to describe the physical extent of the item in terms of screens and so forth. It is also part of our policy that no paper copies should be made. [8], [9]

Although the rules dictate [10] that description must be done from the opening screen, a note indicating this is also required. Other details such as mode of access, contents and a brief objective summary of the purpose and content of the item should be given.

It is imperative to record the Internet address. In the text-based OPAC, this address acts as a reference to the remote electronic resource and can only be viewed by the user. In the Unisa Library, users access the OPAC through the Web.

Bibliographic record as displayed on the WebPac

Corp author	University of South Africa Library.
Title	University of South Africa Library [computer file].
Publisher	Pretoria : University of South Africa Library, 1997.
File info	Computer data

Click on the following to:

Link to this electronic resource on the Internet

Connect to http://purl.unisa.ac.za/oasis/socsci/19563991

```
LOCATION        CALL NO         STATUS
Internet        Online          Available
```

Subject	University of South Africa. Dept. of Library Services.
Note	Title from opening screen.
Sys detail	Mode of access: World-Wide Web.
Contents	About the library--Electronic information resources--Training--What's happening--Information for students--A selection from the Internet
Summary	Profiles the library at the University of South Africa as one of the largest academic libraries on the African Continent. Provides a brief history of the library; the library's mission statement which stresses client focus; the size of the various collections; the library services and resources available; highlights its

Summary	and resources available; highlights its multiskilled personnel and their responsive attitude to technological innovation, and the library's supportive function in the University's role as a distance education institution. Provides links to relevant Internet sites.

Figure 2

In the above example, Figure 2, exactly the same information is displayed, but on the web-based OPAC which is available on the Internet through the University Home Page. The only difference is that the Internet address is now displayed as a hypertext link which acts as a gateway to the online resource. By clicking on this link, direct access is gained to the particular resource. Access to electronic resources can furthermore be enhanced by the inclusion of subject headings, classification numbers and the summary in the note field, and these will be dealt with by Welna van Eeden.

Providing access to the intellectual content of remote electronic resources - Van Eeden, Welna

Through the Internet, scholars and researchers have access to a vast range of dynamic information resources, many of which are not available in any other form. However, automated subject searching on the Internet via search engines does not always guarantee relevance or quality. With the development of Web-interfaced OPACs, which enable users to access remote electronic resources from their library OPACs, cataloguers are challenged to reconsider how the intellectual content of these resources can best be represented and organised. Integrated subject access should be provided through the library OPAC to all formats of information resources. This should include subject access to those parts of the Internet which libraries choose to access via their Webcats. [11]

Subject cataloguing standards and practices have much to contribute to the subject analysis of the information universe found on the Internet. Librarians have been organising the world of knowledge for a long time. Tools such as controlled vocabularies, classification schemes and automated search systems have been developed. These tools could be used, perhaps with minor additions, for the subject cataloguing of Internet resources to ensure proper collocation or arrangement by subject. We should not ignore a century of tradition in subject cataloguing, but continue to build upon that knowledge. [12] Furthermore, the dependence of the library community on shared cataloguing makes it critical that cataloguers abide by the same standards.

The intellectual content of remote electronic resources can be analysed and made accessible to users in Online Library Catalogues:

- by assigning subject headings
- by assigning classification numbers
- by providing a summary in the note fields.

Subject Headings

Why should subject headings be assigned to remote electronic resources?

Although most Web search engines access enormous numbers of hits, research shows that most searchers rarely look at more than two screens of information. Because of this, search engines such as Yahoo are beginning to offer categories of subject searches that can be chosen before making a query. [13]

It is easy to criticize the aimless "surfing" on Web-based search engines without proposing a valid alternative. What are libraries going to do with those parts of the Internet which they want in their Webcats? The alternative could be the application of the basic principles and structures of subject cataloguing to enable a purposeful search and retrieval system which produces results high in relevance and recall. [14] Furthermore, standardised subject cataloguing will ensure the integration of information resources.

A library may choose the system of subject access it desires - the most widely used being the Library of Congress Subject Headings. The Unisa Library uses Library of Congress Subject Headings as standard for subject cataloguing. This standard will be used to provide subject access to remote electronic resources as well.

Why should a library choose to use Library of Congress Subject Headings?

I would like to answer this question by using the Infomine library as an example. *Infomine*, a virtual library developed by the Library of the University of California, contains close to five thousand records describing and providing access to academically useful Internet resources. Their reasons for chosing Library of Congress Subject Headings as subject vocabulary as follows:

- LCSH uses a standardised descriptive language familiar to librarians in all disciplines. This familiarity can be said to exist for many academic library users as well.
- LCSH is a vocabulary that provides a common thread or a set of controlled access points across the disciplines. The schedule has many complex links between related subjects.
- LCSH is useful for both general and high-level subject description. [15]

LCSH have also been applied successfully in:

- *InterCat*, a searchable catalogue of Internet resources. This catalogue, created by the OCLC Internet Cataloging project, comprises nearly 1,000 bibliographic records of selected Internet resources. [16]
- NetFirst, another initiative of OCLC to provide access to resources on the Internet. The initial release containes 40, 000 records and provides coverage of World Wide web sites, listservs, Usenet groups and anonymous FTP sites. [17]

Assigning Library of Congress Subject Headings to remote electronic resources

On the WWW, everything is represented to the user as a hyper-text object. Hyper-text links in sources make the original object a part of a larger whole. In distinct contrast to the static subject content of a conventional book, electronic resources are dynamic and interactive. [18]

The ALA pre-conference, held in June 1997, with the title: "Demystifying subject cataloging of electronic resources", provided ***General guidelines*** for the subject cataloguing of electronic resources. These guidelines included the following:

- Treat electronic resources as you would printed materials and other formats. It is recommended that libraries treat computer files just like any other form of material in terms of the number and kinds of subject headings assigned.
- Names, chronological elements and form should be part of the subject terminology.
- Subdivisions should be used to make a subject heading more specific, However, a subdivision should not be automatically assigned to indicate that the item is an electronic resource. Form should only be brought out where applicable, e.g. for screen savers. At present there is no form subdivision for ?electronic journals? available in LCSH. This is an area in the cataloguing of remote access serials under discussion. Appropriate subject headings should be subdivided only by the free-floating subdivision - *Periodicals* and should not be further subdivided merely to indicate that the serial is in electronic form.

Many form subdivisions are the same for electronic resources and for printed materials, e.g. sources that have the structure of, and present themselves as reference-type works such as directories, bibliographies and catalogues. [19]

Form/genre terminology in library OPACS?

When subject headings are assigned to Internet resources, form terminology plays an prominent role. The Library of Congress decided that form/genre access deserves to stand on its own. They are now planning the implementation of a new sub-field for form subdivisions as well as a new field for form/genre headings in authority and bibliographic records. In OPACs, this new field can be indexed separately as a form/genre index alongside author/title/subject access. This will improve OPACs in terms of indexing and display. E.g., it should be possible to distinguish between *Electronic encyclopedias* issued in electronic form (form/genre heading) and works about *Electronic encyclopedias*. [20] Examples of topical headings which the Library of Congress is considering as potential candidates for form headings are Web sites, Electronic discussion groups, Computer fonts and Screen savers (Computer programs)

Classification Numbers

Apart from subject headings, classification numbers can also be used to denote the subject contents of remote electronic resources. If classification numbers are assigned, and the OPAC allows users to browse and search on classification data, users will be able to find electronic resources in the same way as other materials. However, many OPACs provide only call number browsing.

Classification experts and librarians have long recognised the potential of organised, structured library classification schemes to improving subject access to information:

- to improve precision or recall
- to enable browsing
- to serve as a mechanism for switching between languages. [21]

Many libraries do not assign classification numbers to remote electronic resources as they cannot be shelved physically. Michael Gorman, Dean of Library Services at the California State University, believes that, for electronic resources, ?...we should divorce the question of shelf arrangement from that of classification as a retrieval device... Since classification will be used for subject retrieval rather than for identifying a particular book, there is no reason why, when warranted, the cataloguer should not assign more than one classification number to one document... We should explore the power of online systems to coordinate classification numbers, the index to classification schemes, and verbal subject headings to create a subject searching capability that is beyond anything that we have now.? [22] The principle of assigning more than one classification number is applied by the *NetFirst* database.

The OASIS WebPac of the Unisa Library allows call number searches. This index is built from the USMARC 092 tag (call number) which reflects our holdings and not from the USMARC 082 tag (Dewey classification number) We have, however, decided to add the 082 field to records for remote electronic resources (excluding electronic serials). This was decided because of future developments which may take place in organising remote electronic resources according to classification numbers. As the DDC manual gives guidelines for the choice among numbers, we decided to adhere to these principles and only assign one Dewey number per record.

Electronic versions of the DDC and LCC have made it possible to realise the potential of library classification to improve subject retrieval. However, much of the renewed interest in classification schemes as an organising and retrieval device for information resources has been sparked by the growth in usage of the Internet and World-Wide Web. The hierarchical structures of classification schemes support topic browsing. Captions and relative index terms in translation databases could be used to provide a multilingual subject browser to a database of Internet-accessible resources that have been assigned classification numbers. [23]

Several noncommercial World-Wide Web sites are using DDC and LCC to provide subject access to Web-accessible documents, e.g.

- *CyberDewey: a guide to Internet resources*, organised using Dewey Decimal Classification codes. [24]
- *CyberStacks*, a collection of World-Wide Web and other Internet resources that apply the Library of Congress classification scheme to facilitate identification and use of selected sources. [25]

Online classification data can form an important bridge between library methods of organising materials and Internet-based techniques for accessing electronic collections. [26] OCLC has initiated the *Scorpion* research project to address the challenge of applying classification schemes and subject headings in a cost effective way to electronic resources. The idea behind *Scorpion* is that resources to be subject-catalogued can be treated as queries against a special Dewey database that returns a ranked list of potential subjects. [27]

Summary

The summary field is unique to computer file records and can be used to enhance the subject retrieval. One of the weaknesses of most search engines is that relationships and relevance can often not be analysed without actually examining each item. A summary note on the bibliographic record will enable OPAC users to examine the relevance of individual records and then choose among them immediately prior to accessing - thus saving considerable time.

Cataloguers can coordinate the controlled vocabulary in the subject headings field with the natural language in the summary note, particularly for systems that allow for keyword searching of the summary field.
A summary note should provide a brief, objective summary of the purpose and content of the resource. The summary should include such information as:

- the scope of the work
- the nature and form of the contents
- levels of user activity
- age level, degree of difficulty, and/or intended audience. [28]

The catalogue of the future may well provide a summary of the world's information resources. [29]

Cataloguers have long applied their principles and standards of subject cataloguing to materials of various formats. We should be able to apply these principles to the subject cataloguing of remote electronic resources with equal efficiency, to facilitate access to high quality, well selected and annotated sources.

Keeping URLs up to date - Hartzer, Sandra

Introduction

The point-and-click feature of World Wide Web has made Internet browsing so easy that information can be as close as the click of a mouse, but all too often the click leads to a dead end. [30]

URLs often do not work because Internet resources move, names or method of access change and hardware is reconfigured, among other reasons, leaving users stranded with the all too familiar error message 404 of *Document Not Found*. When a URL fails, all instances of that URL (for example, links in a Web document or a bibliographic record) become invalid. [31]

The volatility of Internet resources is an inconvenience at best. For librarians, it is a serious problem which compromises their service to patrons and imposes an unacceptably large burden on catalogue maintenance. [32]

Cataloguers are responsible for creating bibliographic records for Internet resources and with that comes the responsibility of continually maintaining the accuracy of the location of these resources in library catalogues. How can this best be done? [33]

Solutions to the problem

There are a several possible solutions to the problem:
making use of

- a linkchecker
- URN or PURL
- DOI

Linkchecker

Running a linkchecker against a large library catalogue database is not easy. It is not possible to run the linkchecker against the database itself, which means that all the 856 MARC fields containing URLs have to be extracted, copied into a file and then have the linkchecker run through all the URLs. This method involves a lot of manual work from the cataloguer.

URN

Another solution is the development of Uniform Resource Names, or URNs. The process of defining URNs has been underway in the Internet Engineering Task Force (IETF) for some time where OCLC is an active participant and supporter of this process. [34]

What is the relationship between PURL, URN and URL?

PURLs are a direct result of OCLC's work in the Uniform Resource Name (URN) standards and library cataloguing communities. PURLs satisfy most of the requirements of URNs in the technology that is deployed today. This technology can be applied to the task of maintaining catalogues of Internet resources, and can be smoothly merged into the URN architecture once it is implemented. The assignment of PURLs is an intermediate step towards the time when URNs are an integral part of the Internet information architecture. [35]

Unfortunately the standardisation process is slow. Putting all the pieces in place will require consensus in:

- the IETF,
- the community of Web browser developers and implementors,
- implementation of a new code by the community of network system managers who administer the Domain Name System (DNS) for the Internet. [36]

The concerns and needs of the library community may not be fully appreciated or adequately addressed by these groups quickly enough. Libraries can and should therefore provide leadership in the solution of these problems.

To aid in the development and acceptance of URN technology, OCLC has developed a naming and resolution service for general Internet resources. The names, which can be thought of as Persistent URLs (PURLs), can be used in documents, Web pages and in cataloguing systems. [37]

PURL

What is a PURL?

PURL is the acronym for "Persistent Uniform Resource Locator."

"Functionally, a PURL is a URL. However, instead of pointing directly to the location of an Internet resource, a PURL points to an intermediate resolution service. The PURL Resolution Service associates the PURL with the actual URL and returns that URL to the client. The client can then complete the URL transaction in the normal fashion." [38] In the Web environment, this is a standard HyperText Transfer Protocol (HTTP) redirect. PURLs have been assigned to records catalogued in the Internet Cataloging Project ($g in 856 USMARC tag)

The OCLC PURL Service has been running since the beginning of January, 1996.

Although a PURL Service is being run and maintained at OCLC, the PURL source code is freely distributed on the Internet to aid in the rapid distribution of this technology and since the introduction of PURL, a number of institutions have expressed an interest in running their own PURL servers. [39]

What does a PURL do?

A user selects (clicks on) a PURL on a Web page, in a document or a bibliographic record, the PURL then resolves the associated URL, which the browser then in turn uses to access the resource. [40]

A PURL can be used with the confidence that it will persist over time. The links will remain valid even though the associated URLs might change. This does not mean that a PURL magically changes its associated URL when the referenced resource moves -- the maintainers of the PURL make this happen. [41]

What makes a PURL Persistent?

PURLs never change. This means that a PURL can last longer than any particular URL that may be associated with it. While PURLs allow you to associate different URLs with them, the PURL itself never changes. In other words , you can change what a PURL resolves to, but you cannot change the PURL. [42]

Because a PURL persists indefinitely, all instances of such a PURL will remain valid. If the associated URL of a PURL becomes outdated, resolution of the PURL may fail. Of course, someone has to operate the PURL resolvers that provide this persistence. This is where OCLC plays a big role. As part of OCLC's commitment to facilitating access to the world's information, they are encouraging the use of PURLs. [43]

It is expected that organisations with similar commitments to providing long term access to information will want to run PURL Servers as well, for example:

- government agencies
- publishers
- libraries
- universities

It is therefore important to understand that persistence is a function of the organisation, and not the technology. [44]

What does a PURL look like?

A PURL looks just like a URL because it is a URL. A PURL is made up of three parts:

- the protocol
  The protocol is used to access the PURL resolver. It is important to note that this protocol may differ from the one used to access the resource associated with the PURL, e.g. it is possible to have a PURL (http protocol) for a gopher site.

- the resolver address

This is the IP address or domain name of the PURL resolver. This part of the PURL is resolved by the Domain Name Server (DNS).

- name
  A user-assigned name. This name may differ from the name of the resource in the associated URL.

Here are a few examples of PURLs.

```
   http://purl.unisa.ac.za/oasis/natsci
      ----   ------------- ---------
         /            |             \
   protocol  resolver address    name


   http://purl.unisa.ac.za/oasis/socsci
 ----   ------------ --------------------
        /           |               \
protocol  resolver address         name [45]
```

What is a PURL resolver?

"A PURL resolver is a service, available via standard HTTP 1.0 protocols, that facilitates the creation, maintenance, and resolution of PURLs." [46]

What are PURL domains?

Domains are subdivisions of the name space on a PURL resolver. They are very much like directories in a file system. There are two varieties of domains, namely top-level domains and subdomains.

- a top-level domain is the top-level of the name space on a PURL resolver.
- Subdomains exist within top-level domains or other subdomains. Subdomains can be created in any domain.

For example, the PURL http://purl.unisa.ac.za/oasis/socsci has 2 domains: oasis and socsci; oasis is a top-level domain, socsci is a subdomain of oasis [47]

Which resources should have PURLs?

Users should assign a PURL to any resource for which reliable access over time is desired. For example:

- a home page
- an electronic journal or book
- an individual article or a paper are also good candidates for a PURL.

Resources that do not justify PURLs include:

- sections within a document
- charts or graphics that would not make sense outside the context of their containing document
- temporary resources. [48]

Creation and maintenance of PURLs

To create a PURL, the user should access a PURL Resolver via a Web browser and follow the resolver's instructions for creating a PURL. PURL Resolvers provide a form to fill in in order to create a PURL.

The question arises: are PURLs updated automatically when their associated URL changes? The answer to this question is no, it is the responsibility of a PURL's owner and its maintainers, the cataloguers, to update the PURL when the associated URL changes. Each maintainer is responsible for certain PURLs.

To update or maintain a PURL the PURL resolver's maintenance forms are used to make the appropriate changes to the desired PURL [49]

PURL Source Code

The software, which includes the source code, can be downloaded from the OCLC PURL site. Full instructions are given on how to install the software and also the hardware needed. The later versions of the PURL software also include a validator.

A mailing list is also available. For further PURL information, the PURL FAQ at http://purl.oclc.org/OCLC/PURL/FAQ is very useful. [50]

DOI (Digital Object Identifier)

DOI is an identification system for electronic resources, a universal accession number that never changes. DOI was developed by the Association of American Publishers in collaboration with the non-profit Corporation for National Research Initiatives. Several publishers are taking part in a pilot project which started in July 1997. John Wiley and Sons have already used DOIs in 63,000 items. [51]

The structure of DOI

The DOI system is made up of a prefix and a suffix

- Prefix
  The prefix indicates the DOI directory, e.g. 10, which indicates a US directory, and the publisher's number. This number is assigned by the Corporation for National Research Initiatives, e.g. 1006 for Academic Press.
- Suffix
  The suffix is the item identifier that the publisher assigns to a particular item. Some publishers use the ISBN as the suffix, with a code indicating that an ISBN is used. Other publishers use their own internal numbering system.

Structure of a DOI

```
                10.15678/[ISBN]0123046203
            --------- ----  ----------------
                  /        |                \
  directory      publisher's number  Item identifier[ISBN]  52
```

Benefits of DOI

- It is persistent over time
- It will function in conjunction with the proposed URN system
- Although it is still in its initial stages of evaluation, it is proving to be working well. [53]

Information about getting started with DOI can be found at : http://www.doi.org/started.html

We as librarians owe it to our users to make sure that what we have or what we provide access to in our library catalogue is retrievable. Whether we do it with PURL, URN, linkchecker or DOI, time will tell.

Conclusion

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We librarians are living in exciting times - what with the multitude of technological advances taking place around us and the developments in information distribution and access. We should grasp all the opportunities these developments provide to enhance our service and to meet our users' increasingly sophisticated information needs. None the less, we will only have succeeded once the user recognises the additional benefits of this service.

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List of acronyms

ALA - American Library Association
DDC - Dewey Decimal Classification
DOI - Digital Object Identifier

GAELIC - Gauteng and Environs Library Consortium
LCC - Library of Congress Classification
LCSH - Library of Congress Subject Headings
OCLC - Online Computer Library Center
OPAC - Online public access catalogue
PURL - Persistent Uniform Resource Locator

Biographical details

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Back to contents

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USER-EDUCATION IN A FLEXIBLE LEARNING ENVIRONMENT - AN OPPORTUNITY TO STAY RELEVANT IN THE 21ST CENTURY

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1. INTRODUCTION

Higher education in South Africa is in the process of changing from what is referred to as the 'traditional instructional packages' to 'flexible learning systems' Universities and Technikons are at present exploring the concept of flexible learning and reflecting on its implications in terms of adjustment of curricula, course content and especially delivery methods. The academic libraries that form part of these higher education institutions should likewise be positioning themselves to support and facilitate the new educational philosophy and methods.

2. DEFINITION OF FLEXIBLE LEARNING

The literature on flexible learning confirms that there is no single definition for the term 'flexible learning' and that the term has come to be interpreted very loosely indeed. According to Ellington, (2) the Flexible Learning in Higher Education Network (FLHEN) deliberately did not attempted to define the term, because they prefer practitioners to interpret it in any way they like. A study of some of the definitions that do exist indicates that the flexibility that the term 'flexible learning' refers to has various interrelated dimensions. The following three definitions illustrate this:

- Flexible learning is a generic title for the provision of alternatives to traditional education. It includes concepts like open learning, distance learning and resource-based learning. There is a tendency to combine these concepts in the use of the phrase 'open and flexible learning' (OFL). (4) This term seems to indicate improved access to, and the expansion of, higher education opportunities.
- Although flexible learning is a strategy embraced by distance education institutions, it is not limited to these institutions. It is a combination of contact classes, multiple applications of information technology, the use of study material (print based or other formats) and a variety of assessment methods that can be used as an extension of both contact and distance education (5).
- Ellington (6) in his turn defines 'flexible learning' as a term that covers all situations where students have a say in how, when and where learning takes place regardless of whether the learning takes place within the context of traditional contact education or within non-traditional learning contexts like open learning or distance education. This indicates a renewed focus on the learner as the customer, which led to the initial concept of learner-centred education.

Together, these three definitions list the most important aspects or dimensions of flexible which are focused on in the relevant literature:

- Delivery methods (traditional, open learning, distance education
- Learner-centred approach
- The role of resource-based learning

The implications of these different dimensions will now be discussed briefly.

2.1. Delivery methods and improved access

2.1.1 Focus on massification of higher education

Both the developed and the developing worlds are experiencing a surge of demand for new education and training opportunities. The factors underlying this demand are the following:

- Economic globalisation. Skills needed in the workplace are now relevant beyond national and geographic boundarie, since business is no longer restricted to a specific country or place. Students are in need of better preparation for the world of work, in order to help them prosper in the rapidly changing world of employment. (7), 8) People already active in the world of work in their turn need to re-skill in order to continue to be relevant in the workplace.
- The technological revolution which demands ever-increasing levels of technological literacy.
- In South Africa specifically there is a drive for the massification of higher education as a means of socio-economic transformation and redress of past inequalities. Some of the challenges faced by the South African higher education system are the provision of access to higher education for as many people as possible and developing teaching strategies and delivery methods to meet the needs of larger student intakes. It is anticipated that the number of students in South Africa will increase from 800 000 in 1995 to 1 500 000 in 2005. (9)

2.1.2 Flexible delivery of education as an instrument of massification in South Africa

There seems to be little doubt that distance education, incorporating the principles of open learning and resource-based learning, will play a major role in providing flexible access to higher education in South Africa. (10) Flexible learning is regarded as an extension of the concept of open learning designed to give learners a choice of learning strategies and a choice of place, pace and time of learning which can be instrumental in the massification of higher education. The National Qualifications Framework (NQF) is seen as the vehicle for the implementation of flexible delivery of education. The aim of the NQF is to promote access to education and to "make it possible for all candidates to achieve national qualifications through a wide variety of mechanisms and a multiple delivery system". (11) A similar system already exists in Britain in the form of National and Scottish Vocational Qoalifications (NVQ's and SVQ's) (12) while Australia's National Training Reform Agenda aims to develop flexible workplace skills or multi-skilling.

At this stage of the development of flexible learning in South Africa, there is a tendency to equate flexible learning with the flexible delivery or provision of education opportunities. The focus is largely on how to deliver eduction to increasing numbers of students, with little debate about the inherent characteristics of flexible learning and the implications thereof for education providers. Although flexible delivery is an important aspect of flexible learning, this is not all there is to it. The interrelatedness of the different dimensions of the concept makes it imperative to give due consideration to the other two aspects listed above, namely the learner-centered approach and the role of resource-based learning..

2.1.3 Learner-centred approach

Learner-centred education is a philosophy of how teaching should take place. It focuses on the relationship between learner and teacher, and the nature of the curriculum. The point of departure of this philosophy is that people learn best when they are interested in a topic and when they need specific skills to solve a problem. These skills are acquired through active exploration and construction rather than the passive attendance of lectures. (13) This philosophy is not new but the application as a dimension of flexible learning is. Within the flexible learning strategy the focus is on the student or learner's learning activity with the twofold aim of:

- meeting the learner's need for learning
- giving learners increasing responsibility for their own learning and development

This constitutes a refocus of education away from the traditional teacher or lecturer centred model where the lecturer is the expert on a subject and aims to teach a given delimited subject content to learners by means of formal lectures in the case of contact education and study guides in the case of distance education.

2.1.4 The role of resource-based learning in flexible learning

The third dimension of flexible learning that needs to be considered is the role of resource-based learning.

2.1.4.1 Definition of resource-based learning

It is sometimes suggested that flexible learning has its roots in resource-based learning because the lecturer in the flexible learning situation, where the focus is on the learner, is no longer the only or most important supplier of information. The lecturer integrates the use of multiple resources into the learning process with a view to enable students to:

- access a variety of sources of learning without intervention from the lecturer
- select and analyse information on a given subject and present it in the form of a report
- plan how to use resources for different purposes
- develop information management skills
- develop competence in using sources of information like libraries (14)

Brown (15) defines the following types of resources:

- **Paper based learning resources** including course guides, booklets, manuals, study units, textbooks, reading guides guides, lecture notes
- **Computer-based materials** including computer-based tutorials, on-line objective testing and multimedia.
- **Networked learning resources** like on-line tutorials, networked study programmes and computer conferences.
- **Media-based material** including audiotapes, video tapes, transparencies, and slides

The elements of resource-based learning as listed above, indicate that it is a learning strategy which requires the ability to find and use information and knowledge effectively, since it integrates both thinking strategies (especially those involving the effective use of information) and the use of multiple resources into the learning process.

3 RESOURCE-BASED LEARNING AND INFORMATION LITERACY

There is a clear overlap in the concept of resource-based learning and the concept of information literacy as it is used in the library and information science environment. In order to illustrate this, the definition of information literacy will be discussed and compared with that of resource-based learning.

3.1 Definition of information literacy

The definition of information literacy that is widely accepted in library and information science literature is that of the American Library Association (ALA) which states that 'to be information literate a person must be able to recognise when information is needed and have the ability to locate, evaluate and use effectively the needed information'.(16) In the South African context the 'operational definition' of the concept developed by Sayed and De Jager (17) is most appropriate: 'Information literacy refers to the ability of learners to access, use and evaluate information from different sources, to enhance learning, solve problems and generate new knowledge'. It needs to be emphasised that the concept of information literacy includes both information skills (the ability to handle information effectively) and library skills (where and how to look for information, or information gathering skills). (18) An added dimension of information gathering skills which is also related to library skills, is computer literacy in the sense of acquiring a set of skills to facilitate locating and usefully organising information in cyberspace - notably the Internet.

Behrens (19) also points out that information literacy 'lies at the higher end of the literacy continuum'. This continuum can be said to start with the basic literacy skills of reading and writing, continue through the ability to locate needed information to the ultimate goal of evaluating and applying the information to solve a specific problem. It can be presented as follows:

Literacy --> Library skills --> Computer literacy --> Information literacy

Figure 1: The information literacy continuum

True information literacy can be said to be dependent upon acquiring skills in library use and knowledge of information resources.

3.2 The interdependence between resource-based learning and information literacy

The extent of the interdependence is very evident from the following summary of the attributes of both resource-based learning and information literacy:

Resource-based learning	**Information literacy**
Ability to access information sources	Ability to access information sources
Use a variety of information sources	Use a variety of information sources
Select and analyse information	Evaluate information
Present information in the form of a report	Generate new knowledge
Competence in using libraries	Library use skills

Table 1: Comparison between resource-based learning and information literacy

Apart from the similarities listed above, both resource-based learning and information literacy are associated with acquiring skills in preparation for lifelong-learning. (20, 21, 22) The overlap between the two concepts indicates that information literacy can be regarded as the basis of resource-based learning. Resource-based learning cannot be completely successful if the students have not mastered both the lower and the higher end of the information literacy continuum. This interdependence can be represented as follows:

Resource-based learning

Literacy --> Library skills --> Computer literacy --> Information literacy

Figure 2: The interdependence between resource-based learning and information literacy

3.3 Implications for academic libraries

The factor that needs to be considered urgently by academic libraries is the fact that successful resource-based learning at the higher education level is only possible if learners are in possession of a range of information handling skills (including library use skills) - if they are in fact fully information literate. Research in the field of library and information science in South Africa, especially that done by Behrens (23) has however indicated that many students entering higher education institutions are unprepared with regard to the information skills required for study at tertiary level, as a result of shortcomings in the primary and secondary schooling system. The research by Behrens was done before the focus on flexible learning, which means that her findings will be even more valid today in view of the demands of this learning strategy on the learner. Moore (24) also points out that learners who started their education in the previous educational dispensation where the focus was on rote learning, will experience problems in adapting to the flexible learning environment. Experience has taught librarians that students lacking information skills do not do independent study but expect all relevant facts to be provided by the lecturers, or by the librarian.
Lack of information handling skills or information literacy is not a uniquely South African problem. The report of the National Committee of Inquiry into Higher Education in Britain which appeared in 1997 (known as the Dearing Report) states that 'Library staff has told us (the Committee) that they have to spend more time supporting students, and that many students come from school ill prepared for this independent form of learning'. (25)

Academic libraries can expect one of two results from the focus on flexible and resource-based learning:

- A growing perception that there is no need to use the library due to the practice (especially in distance education environments) of supplying students with a complete set of resources in the form of mass-produced, pre-packed information kits.
- A renewed interest in, and pressure for the provision of user education programmes, starting with basic library skills for first year students and developing towards cognitive skills such as synthesising and evaluating information at third year and post-graduate level.

4 STRATEGIES FOR PLAYING A CENTRAL ROLE IN LEARNING ACTIVITIES

In view of the characteristics and demands of open and flexible learning, academic libraries need to revisit their current practices and focus on strategies to ensure that the library plays a central role in learning activities. The following two strategies seem to be a good starting point.

4.1 Adapting the role of the library and information professional

The practice of assembling so-called complete information kits for students, referred to in the previous paragraph, is a reality and it is not to be expected that librarians can or should try to stem this tide. The fact is that it does offer some sort of solution for giving learners, and especially distance education learners, access to information they would not otherwise have had. Supplying students with information kits does not, however, guarantee successful learning. The role of the library should be to warn against the possibility that learners will become only partially information literate. Providing them with all the necessary information sources might help learners to acquire the skills at the higher end of the information literacy continuum, but not the information gathering skills required to support life-long learning. Only students already posessing the relevant information literacy skills enabling them to evaluate information and to apply it in the learning situation (and later on in the workplace), will really benefit from this practice. Chalkley (26) and the UK Department of Employment, (27) warns that supplying students with complete information kits will deny them the challenge of researching their own information and transfer dependence on lecturers to dependence on the information kits. These students will probably find themselves at a disadvantage in the workplace as well, because there it will be expected of them to be able to gather their own information - employers are not likely to supply them with information kits to rely upon.

To counter these negative effects, librarians should play a more central part in the learning process as a whole. This strategy has been advocated by various authors, inter alia Behrens, (28) Sayed & De Jager, (29) Shepherd, (30) Stephens. (31) Such a strategy has been implemented at the North East Wales Institute (NEWI) in Wrexham, Wales. At this higher education institution, senior librarians have been accepted as full members of course teams which develop curricula and courses. This enables them to contribute research skills, study skills training and individual project guidance regarding relevant paper-based and electronic resources, to support curriculum delivery. (32)

4.2 Developing user education in support of flexible learning

4.2.1 From user education to information user training

A variety of terms and definitions are used to describe the training of library users. Sager (33) uses the terms bibliographic instruction and user training as synonyms and states that these include any and all teaching activities that are planned, designed and offered to improve the skills of the users in order to be able to collect and organise information independently. According to Salony (34) the terms library instruction, user training, bibliographic instruction and information literacy are generally used when reference is made to the teaching of library users. Behrens (35) states that library training is a teaching programme to equip users with information skills that enable them to use the sources and facilities of the library effectively. Van Brakel (36) uses the term library education and states that it has the aim of effecting any form of independence which will enable the user to handle practical information sources with the greatest efficiency.

Behrens (37) found that library skills is the traditional ability of being able to use the services, sources and facilities of the library effectively. These include the skills to be able to locate information through, for instance, the catalogue or index. A person who has these skills is therefore library literate. She also claims that a broader concept of library skills has emerged as a result of the information literacy movement. The modern view is that the skills are not limited to library use but also includes the skills to locate and utilise information outside the library. In view of this, Henning (38) uses the term "information user training" to indicate training that consists of all the components to render students library and information literate. Information user training also indicates 'portable' skills that are applicable both inside and outside the library.

4.2.2 Necessity for information user training

Van Brakel (39) found that since the forties there have been indications of library orientation and library education at academic libraries. Even at that time, this was a definite function of the reference section of the university library, but its development and growth was sporadic and slow. The large variety of formats in which information is available and the limited exposure to libraries at primary and secondary levels were factors that increased the need for this training. The training was also seen as essential for students who enter their careers after their tertiary training and who must remain up to date with the most recent and relevant information published daily in vast quantities. This is even more true now than it was in the first half of the twentieth century.

Behrens (40) found that user training is important to equip students for the continued education demanded by modern society. The aim of the training should be to expand from the education in library skills to a wider spectrum of information skills demanded by information literacy. The report of the Work group on Information Competence (41) highlights information skills as a critical competency required by all students. The work group emphasised the necessity of information skills, especially the ability to locate information because:

- There is such an abundance of information available that learners cannot be expected to, and in fact do not, remember everything they are introduced to in lectures. They must be able to find information as and when it is needed.
- New information is generated constantly and in addition to this, information changes so quickly

> that that which is currently appropriate could cease to be so in future. Learners must have information finding skills to enable them to keep up to date.

The work group also recommended that a programme for information skills be launched for distance education. Research by Henning (42) confirms the urgent need for information-user training for distance education learners. Her findings also indicates that information user training should be a discrete, compulsory and credit-bearing module for first year students.

4.2.3 Influence of information technology on information user training

Salony (43) claims that information technology had a great influence on the development of libraries and on information user training. It is apparent that this influence will become even greater in the future. With the increased in use of, Internet, for example, the focus on concepts of information literacy will intensify.

Rodriques (44) alleges that information technology offers many opportunities for librarians to offer decentralised services and training. Thus a virtual classroom can be established for the training and students can receive such training through multimedia lessons.

Wielhorski (45) states that it is important from the planning stage of library services to determine how the users can be reached through the help of information technology. Traditional user guides can be made available electronically. At the University of Michigan, for instance, a project has been developed jointly by the library and the Department of Library and Information Science. Subject-oriented electronic guides are available on the World Wide Web network for students. Electronic classrooms can be used to offer the training such as those at the Steen Library at Stephen F Austin State University, which are equipped with interactive video and sound equipment. Commercial electronic guides for reading compact disc databases are already available for training. Computer-supported education can also be used to compile programmes according to the needs of the specific institution.

5 INFORMATION USER TRAINING AS A MEANS OF SURVIVAL IN THE 21ST CENTURY

There has never been any doubt in the minds of library and information professionals that information user training is a very important facet of a relevant library and information service - whatever the kind of library. For academic libraries which form part of higher education institutions embracing the philosophy of flexible learning, it has now become even more important. Henning (46) found that there is a need for continued information user training. It is not something that can be completed in the first year because each level of study, from first year to post-graduate level, requires additional information literacy competencies. If we go back to the information literacy continuum, it can be represented as in Figure 3.

INFORMATION USER TRAINING

First level Second level Third level

1 1 1

Resource-based learning

Library skills --> Computer literacy --> Information literacy

1 1 1

Library procedures: • Circulation • Special services (photocopies) Introduction to: • Classification and shelving • The catalogue • Reference sources • Information formats (journals, etc.) Compiling a bibliography	Use of computerised catalogue Use of journals Techniques for searching for information Further guidance in compiling a bibliography	Advanced information searching Scientific reference techniques Selection, analysis, inter- pretation, systematisation of information Storing compiled information for reference

Figure 3: Information user training in support of flexible learning

The competencies needed for each level of study have been identified in broad terms as indicated in Figure 3. Information user training should therefore be developed on different levels. It may be that the levels will coincide with formal levels of study but it might also happen that a first year student is already library literate and will be able to move on to the second level immediately. It might likewise happen that a senior student needs to start at the first level of training because of a lack of experience and knowledge about using the library to support his or her studies. The implication is of course that students will have to be assessed to determine their level of competency, and that attaining these competencies should be compulsory - not just something that is nice to have.

6 CONCLUSION

The focus on flexible learning and by implication information literacy, might prove to be the best opportunity the library and information profession has ever had to play a truly central role in education provision in South Africa. It is a means to survive and stay relevant in the 21st century if the profession is able and willing to do the following:

- Develop campaigns to make academic staff aware of the implications of flexible learning for students in terms of information literacy skills and the need for information-user training to be compulsory and credit bearing.
- Plan for the changing role of library and information professionals and ensure that they form part of the process of curriculum development.
- Actively developing information-user training programmes on different levels and in different formats from traditional print-based material to interactive computer-based programmes.

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Back to contents

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IATUL

THE NEW LIBRARY, A HYBRID ORGANIZATION

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Paper read by Leo Waaijers, librarian of the Delft University of Technology, at the conference of the International Association of Technical University Libraries IATUL in Pretoria, South Africa. 2 June 1998.

In the last decade technology exploded into libraries. It impacted not only library work processes but imported also new strategic options. Library systems, i.e. databases, imported notions of project management and efficiency and resulted in catalog sharing. The Internet with Gopher and Veronica, brought co-operation in the field of document supply and collection co-ordination. The most consequential technology, however, is the Web. It combines instant publishing, hyperlinking, interactivity and multimediality. And it's so easy to apply. Numerous new actors will make their entry into the information chain which, of course, means competion. Libraries need to define their position in this Webbed World. They have to enter the market place at least partially which transforms them into hybrid organizations, both vanguard and debatable.

Databases

Once there were databases. Only very few people in libraries knew how to operate them. As alchemists they worked in a niche for a decade or so and their activities did not really impact their organizations. This was strange. After all, for centuries libraries had built paper databases of their book collections, which they called catalogs. Why not apply this new technology straight away? I have never found a satisfactory answer to this question.

But then in the eighties the new database technology (coined 'library systems') came to market . Libraries realized, sometimes pressed into action by their patrons, that they could not play dumb any more and massively they started to take these systems aboard. It was the era of grand library automation projects. This time the implementation of the new technology did have an organizational impact on libraries. Like ufo's in a rural community projects and project management were weird phenomena in these Mintzburgian machine bureaucracies. Concurrent with the automation projects, new managerial concepts such as project leaders, deadlines and deliverables entered the library. Quantification was introduced. We measured numbers of records, numbers of keywords per record, the size of a set, performances, keystrokes per second and so on. Often these figures were related to money and so, notions of efficiency rooted in libraries. From there it was a small step to ideas and practices of catalog sharing. As a strategic consequence, the phenomena of partnership and consortium became fashionable, often between libraries, sometimes between libraries and computer centres. Needless to say that thinking in terms of money and efficiency found an economical breeding ground in budgetary stringency since libraries were viced between monopolistic price increases by most publishers on one side and budget reductions by their universities on the other.

I am rather convinced that, at the time, most library workers have perceived this change as a one off operation. From now on their good old card catalog had been transferred into its digital equivalent, which certainly had some advantages. Every meaningful word in the title was indexed, Boolean searching became more than a theoretical notion and macro's made tasks simpler. But that was it. Staff members believed that, once the card catalog was automated, serenity would soon resume its dominant position in the library and traditions would proceed as usual.

Internet

However, before they got over the initial shock, the Internet broke out and 'telnet session' became the magic word for libraries. Now we could look into each others catalogs worldwide and Gopher and Veronica came to assist us to really trace these catalogs. As a direct result interlibrary loan boosted, especially when the remote catalog had a dedicated e-mail ordering facility. This time the strategic side of the coin was collection co-ordination. Practically, this came down to cancellations co-ordination as the exponential serials price increases endured. By tuning their cancellations libraries could mitigate the consequences thereof for their end users. Occasionally the wiseness of this frog cooking policy was and still is questioned. By the way, if you put a frog in cold water and then start to heat it slowly the frog will never leap. Nor did our end users, although in Delft for example, the number of subscriptions halved over ten years. This reflection, however, does not alter the achievements of libraries in the area of document supply and collection co-ordination. It was not unnoticed by publishers who scowled openly on and off.

The Web

Before we had time to really comprehend their historic meaning Veronica and Gopher were swept away by the World Wide Web with its graphical feasibilities, its hyperlinking facilities and its interactivity. I dare to call the Web a real sexy innovation, that is: it's appealing, easy and cheap and it procreates new actors.

It's not only libraries who are still trying to grasp the prospects, neither is it risqué to prophesize that the Web has the potential to metamorfosize the information chain. Everybody can easily become his own publisher and may include audiovisuals, executive programs and direct links to related objects in his publication. At the very moment the publication is completed one keystroke is enough for prompt worldwide access, complete with a direct interactive connection to the author himself. What more do you want?

All parties in the information chain are confronted with questions like: Where can we still render added value? What do we have to offer in the future? What is our position in the information chain?

The opposite question: 'Which behaviour will become obsolete?', is easier to answer. For publishers my guess would be: Sitting there, demanding exclusive assigment of copyrights in exchange for publication and consecutively abusing the thus acquired monopoly for price increases of 10% and up per year will no longer be accepted. And for libraries I would say: Sitting there, converting subsidies into static collections, building elaborate catalogs and further complacently enjoying a local monopoly, will no longer be accepted All parties have to realize what the Web does not offer and then base their contribution upon these omissions. In such an approach two values come to mind: quality and integration. Because the Webbed World is our contemporary Wild West these two values are not guaranteed, so, it's there where professional parties in the future information chain may find their mission. Traditional publishers have a lead when it comes to quality selection, whereas libraries are integrators by birth, but no doubt, both processes will have to be reshaped profoundly. The raw material will increasingly exist of open Web publications of widespread variety in quality and format. Publishers will have to trace the fruits in this wilderness just like their colleagues from the press have to select relevant press releases out of a daily flow of news signals. And no transfer of copyrights will be attached. As president Bill Clinton does not have to assign the copyright of his State of the Union to the New York Times in order to get it published, why should a scholar have to do so for his article? On their side, libraries have to face changes that are equally drastic. The Web dislocates important functions of a library. That is, libraries that are not present on the net are out, or stated in a hyped way: For libraries the only reality is the virtual reality. And there, in that fragmented new world chaos reigns. Compared to the monomedial paper world the polymedial society will show a patchwork of protocols, standards and formats. The strategic component of the Web is competition. The information chain is really compressed and every actor can bypass all the others on the way to the end user. There, on the end users desk, all suppliers meet and rival on price, ease of access, recall and precision, and reliability. Some of these factors are, in principle, measurable and subject to benchmarking. Others, like reliability are at least partly related to trust and good experiences.

Delft

How does Delft anticipate this Web future? Again, there is the tangible technology on the one hand and the more abstract strategical level on the other. Integration is the keyword in either case.

First then, briefly about technology. Bits are fine when it comes to production, transport and retrieval of documents. For serious storage, that is authenticity proof and durable accessible storage, bits are questionable whereas paper is proven technology. For study and reading paper is unsurpassed. Nobody wants to read a screen for hours. So, one of the basic integrations that libraries have to accomplish is bridging the gap between the lasting paper world and the empire of bits and bytes. The technology for both passages exists: in one direction it is called a printer and in the opposite direction it is a scanner, possibly in combination with OCR technology. An interesting application of scanning technology is what we baptised DocUTrans. Instead of making photocopies for document supply we now make scans. According to the preference of the client the machine will automatically send this image to the printer, in case the client wants a hard copy, or convert it into a fax format and send it to the client's fax adress or attach it as a pdf file to an automated e-mail message. The machine does the financial administration as well i.e. it keeps the receivable accounts ledger and prints an invoice or debits the clients' deposit account. To date almost 5% of our articles are delivered as an e-mail attachment, a figure that we expect to rise sharply when we start to offer this service all over the university campus later this month. Needless to say we are very proud that ETH Zurich will soon start to use DocUTrans and that other customers are seriously interested.
We also apply other integrating techniques, e.g. for automated indexing of both the full text journals and the databases that we offer at the university campus site we use Verity's Search '97 software. And of course we also apply the Z 39.50 browser for which we developed, under our own steam, firstly a Windows version in '95, making the step to the Web environment one year later. This Web version of Z 39.50 is also one of our available products.

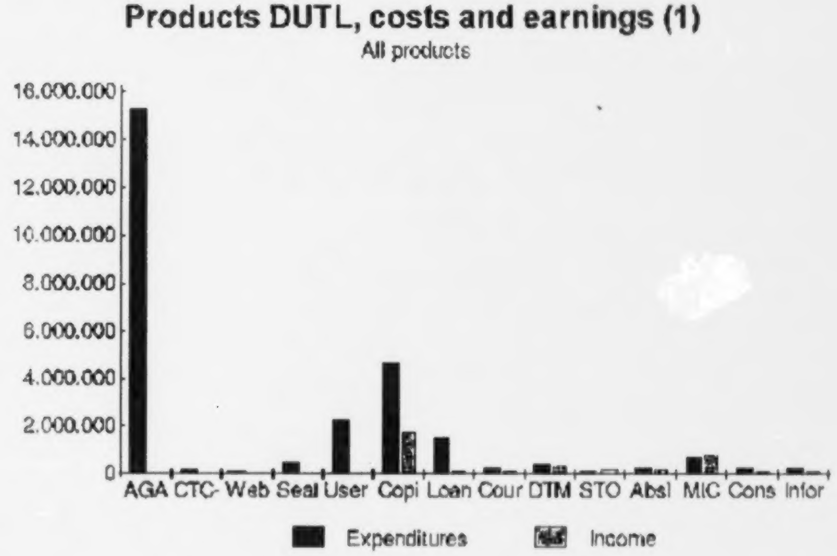
But not every integration is purely technology based. A couple of years ago we acquired the Maritime Information Centre from a maritime foundation that was dissolved. It comprised two databases, a bibliographical one called Marna and another with descriptions of ships, called Shipdes plus a weekly issued collection of newspaper clippings. We combined the Centre with our own maritime collection and subsequently set up a call centre for all types of questions and searches in the maritime area. Next, we will add a database of all maritime research projects in the Netherlands and a tentative concluding step will be the setting up of an interactive maritime homepage for the Netherlands maritime world. Here integration is materialized by library intermediairies who are real experts in their field. If this new 'knowledge centre', as we have aliased it, turns out to be succesful, we foresee a development of the Delft library into a network of such knowledge centres.

This brings me to the most challenging long term consequence of the Web - the strategic one. It's name is competition. How do we anticipate that in Delft? Let me begin a couple of years ago when we more or less intuitively started to diversify our products and services. Apart from the products I allready mentioned, we started to give Internet courses and other courses in information retrieval, we accepted commissions to build specific databases and recently we set foot in the world of consultancy, insourcing and interim management. There is a heavy demand for these type of services as a direct consequence of the metamorphosis in the information world that is catalyzed by the Web technology. Both individuals and organizations feel that they cannot neglect this new development but, on the other hand, they are not sure how and where to apply it and what impact it will have on their organizations and processes. We do not pretend to have all the answers, but coping with the Web, organizing information and serving end users are our core business. Others know that and turn to us for support, advice or supply. And we try to meet their needs.

Pricing information

In most cases these new services and products are not for free since our subsidies have not kept pace with this new developments. On the contrary, budget reductions (and price increases) have forced us to discontinue services like building a national technical book catalog. So the new products must be price tagged. Next question: what price? The most frequently heard spontaneous reaction is: At least cost recovering. So the original question is replaced by a new one: What are the costs of a product or a service?

Last year we have answered this question in Delft. The problem to be solved was formulated as follows. The total income of the library for the year 1997 is 26 million guilders. At the end of the year all this money is spendt. In exchange we have given to the world a host of services and products. The project task was to develop a model that broke down all our costs according to products and services.



For that purpose we needed a catalog of all our products and services. So we made one, which is an interesting and useful exercise in itself. It turned out that we had 58 products but for the ease of reference I will limit myself to 14 products or productgroups in this presentation. Other aspects of the implementation of the project included the introduction of staff time keeping and a depreciation scheme for the library inventory.

Not surprisingly it turned out that our most massive product by far was AGAC, acronym for A Good Accessible Collection. That is the collection, including bibliographical databases and full text journals plus the OPAC. It costs 15 million which is almost 60% of our total budget. An interesting observation is that the purchase price of the whole collection is just over 7 million. This means that the process of selection, administration, cataloging, stacking - be it electronically or on shelves - and taking out, shortly transferring the purchased pile of information into a good accessible collection, more than doubles its value. AGAC generates no income. For people who come to the library access to the catalog, the databases and the electronic journals is free and so is borrowing of books and browsing journals that cannot be borrowed. So this product is fully subsidised. Another completely subsidised product is our Central Technical Catalog for Periodicals, a database that comprises the periodicals collections of over 100 libraries in The Netherlands and which we build in our capacity as the national technical library. Further our website, 1500 study seats spread all over the university campus and last but not least user support. This last service accounts for 8% plus of our expenses.

The common denominator of these products is their infrastructural nature. The costs show hardly any relation to the usage and there rationale is a political one. I.e. someone, in our case both the minister of education for our national role and the university board for our local task, decides to supply the community with a free information provision and they grant a mission subsidy for that goal.

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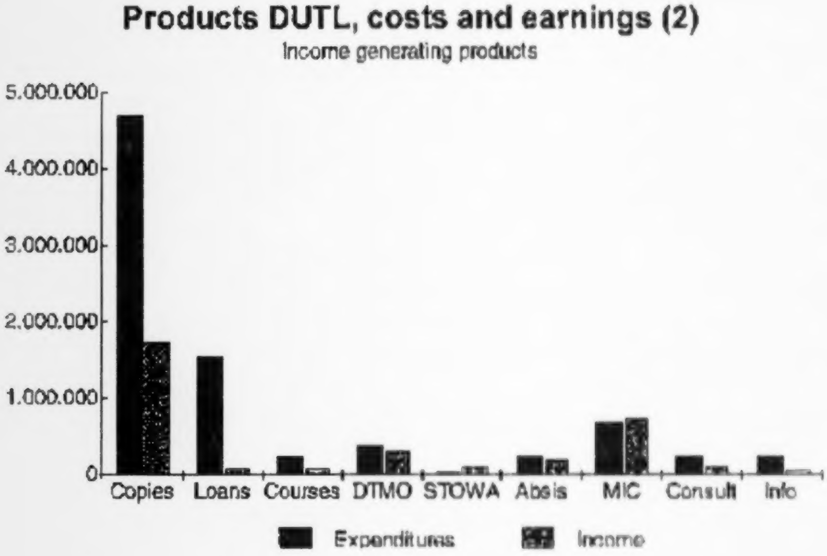

All our other products generate at least some income. The product related earnings account for 15% of our total budget. More interesting however is the percentage of cost recovery when we omit the infrastructural products i.e. when we restrict ourselves to the group of income generating products itself. Then we come to a cost recovery of 40%, meaning that 60% of these products is still subsidised. Noteworthy is that the income from copies covers only one third of the expenses. So, to become cost recovering this product should be three times as expensive, under the assumption that this causes no drop in demand. For your information, the current price is half a dollar per copy with a minimum of three and a half dollar. The income from loans cover less than 5% of its costs.

The products indicated with DTMO, STOWA and Absis all concern databases or derivates thereof. They nearly cover their costs. STOWA in fact is profitable, as is MIC, our aforementioned Maritime Information Centre.

Why do we think this is such an important exercise, the unearthing of our product-related costs, that is. There are a number of reasons. Firstly, it provides us with important information for policy decisions within the library itself. This information is instrumental, not to say crucial for decisions whether to start a product and at what price or to discontinue one. It does not mean that all products must be profitable from now on or even cost recovering. But if neither is the case at least we know how heavy it is subsidised. In the longer term we can follow how costs develop and thus become aware of the effects of efficiency measures and implementations of new technology within the library. Secondly, if other libraries did the same, these cost figures could play a key role for benchmarking purposes next to quality figures like delivery times, opening hours, up time of the catalog, last update of the homepage, quality of telephone reachability etc. This benchmarking provides important incentives to improve the library processes.

Thirdly, it enables libraries to fully account for the subsidies they are granted. In our case almost 80% of our subsidies are used for the information infrastructure mentioned above: i.e. for a good accessible collection, the central Dutch catalog of sci-tech journals, the study seats in the university, our website and for user support. The other 20% plus of our subsidies are mainly used to financially assist document supply (books and copies) but also for supporting other products such as courses, searches etc.

Hybrid

This insight places us in the core of a hot and topical debate in the Netherlands about the relationship between government and market. The central issue is a possible market role of a governmental body, the so called hybrid organization. The most rigorous participants in this debate reject such a role absolutely and advocate a strict distinction between the public and private worlds. They fear false competition as a consequence of cross subsidising i.e. abuse of public money for outpricing a potential competitor. Most participants however recognize that governments do subsidise anyway e.g. in the agricultural sector or in cases of so called vital industries. Also, cross subsidising is not unknown within big companies where strong products support the weak ones, which of course may falsify competition as well. Currently, new rules are being prepared by the government for this complex economical field. They must regulate new situations for privatised governmental bodies like PTT, the railroad and others where a strong infrastructural component is to be combined with market activities. They will also apply to universities who operate more and more in the knowledge market. Needless to say that we will follow this issuing of rules with more than normal attention. Will the library as a hybrid organization be allowed and under what conditions?

Even if the first answer is yes, there is still a hurdle to overcome. Can the hybrid organization be stabilised? Quite a few organization experts predict that the subsidy and the market cultures are not compatible in one and the same organization. "Market will drive out subsidy" they say and they explain that the market side of the organization is so attractive to the better employees, because of result driven reward systems and other enticements, that at the end of the day only losers will man the subsidy side. I think that this view is based on an outdated and by now caricatural image of the classical civil servant. Today in the public domain notions of quality, efficiency, client orientation and innovation are just as highly valued as in the private world. On the other hand, profit is no longer the only driving force in many a company. More and more companies serve ethical values as well. I think that the common values in both worlds may give enough coherence upon which to build a stable hybrid organization. For such an organization sustainability is the keyword and this may be reached by a blend of subsidy and (decent) profit. It's the route the Delft library has chosen. The need to compete and make profit keeps the library on its toes while a subsidy enables it to maintain an information infrastructure that is available to the community, thus preventing a social division between information-have's and have-not's.

To conclude

A couple of years ago, more through intuition than awareness, we have answered the question: "Do, we have to wait lethargically while the Web enables everybody to become publisher, agent and librarian alike?". We took a proactive stance and broadened the scope of our products and services, even entering the marketplace to find out that we belong to a new species: the hybrid organization. It is a vanguard organisation type and in our case the thriving result of a xenogamy between the subsidised free-flow-of-information mother and a market driven information-as-an-economic-good father.

Delft, May 1998
Leo Waaijers

Back to contents

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